# ELECTRICAL TIMES

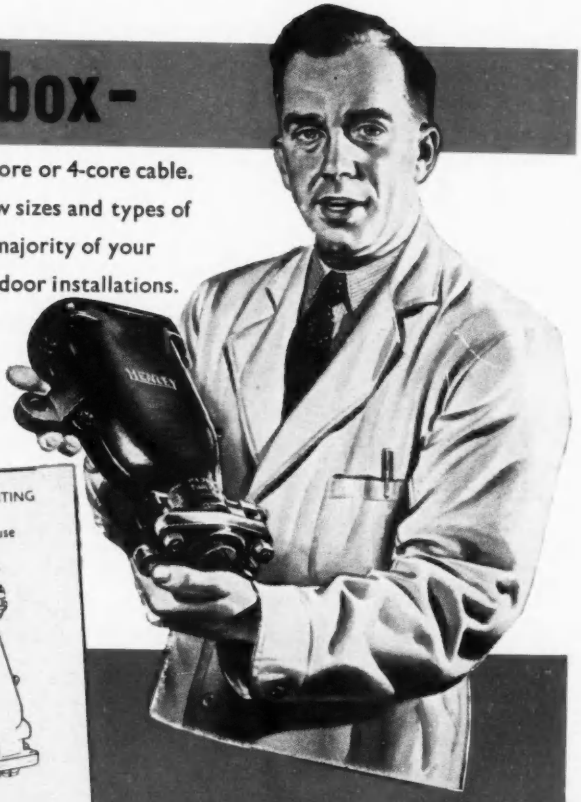
THURSDAY
4 SEPT.
1952
NINEPENCE

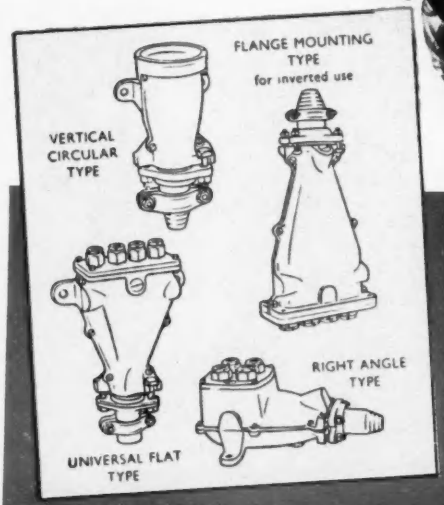


## This *one* box–

can be used with twin or 3-core or 4-core cable. You need only stock very few sizes and types of boxes in order to meet the majority of your requirements for 660 volt indoor installations. Henley Catalogue 35 shows which boxes to order.

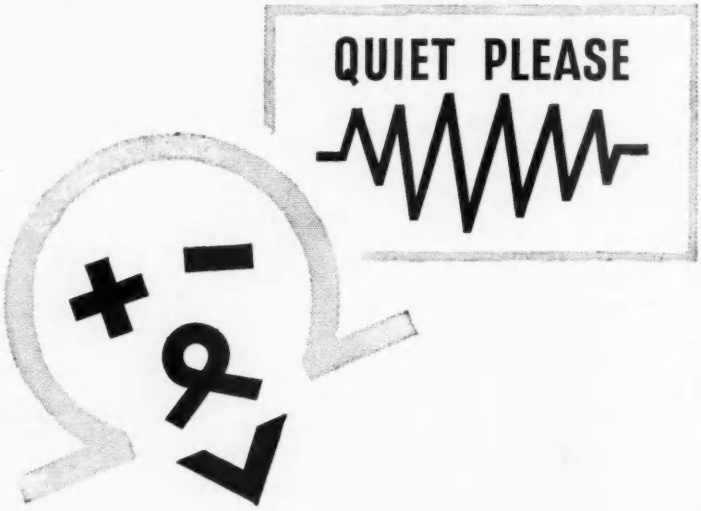
*Please ask for Catalogue 35*






HENLEY
INDOOR
TERMINAL BOXES
660 volts

W T HENLEY'S TELEGRAPH WORKS CO LTD 51-53 HATTON GARDEN LONDON E C 1




# Complete electrical breakdown

IT really is too bad. Our friend should never have been subjected to such violent treatment. But it is his own fault entirely. He took on the job as insulator, claiming amongst other things, a fine, even temperament. Complete breakdown came with his first real test! He just couldn't stand up to it.

*The point we wish to make is that insulating materials must be CONSTANT in the performance of their functions — and constancy is a characteristic very much in evidence in the range of DELARON Laminates.*

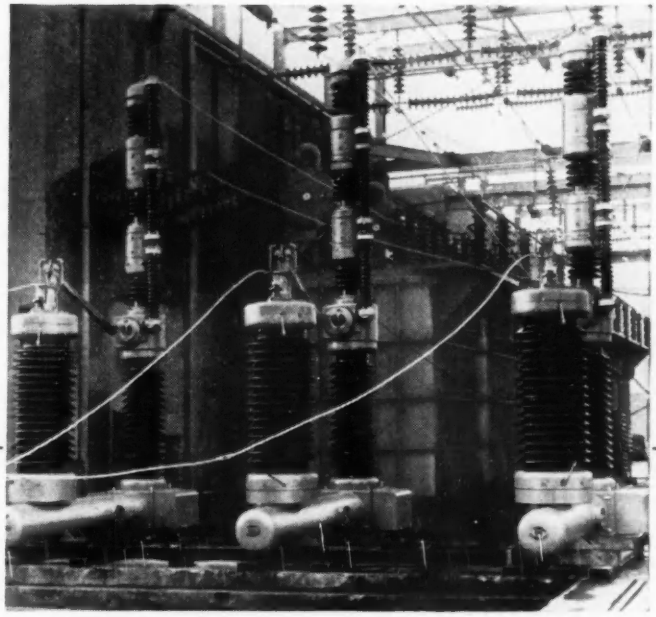
Delaron
MADE BY
DE LA RUE

*Please write for the Delaron Data Book which gives full details of our complete range:*

**THOMAS DE LA RUE AND COMPANY LIMITED (Plastics Group)**

IMPERIAL HOUSE, 84/86 REGENT STREET, LONDON, W.1. TELEPHONE: REGENT 2901

## *Unit construction under test*



This 132 kV 3,500 MVA three interrupter circuit breaker is one of the range of 'ENGLISH ELECTRIC' high voltage air-blast circuit breakers using common interrupters and other standard parts.
The illustration shows the circuit breaker on short-circuit test.

# 'ENGLISH ELECTRIC'

## air-blast switchgear

THE ENGLISH ELECTRIC COMPANY LTD., Queens House, Kingsway, London, W.C.2
*Switchgear Department, Stafford*

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON
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A

**'HAWKE' IMPROVED COMPRESSION TYPE CABLE GLANDS AND SEALING BOXES FOR ALL TYPES OF CABLE**

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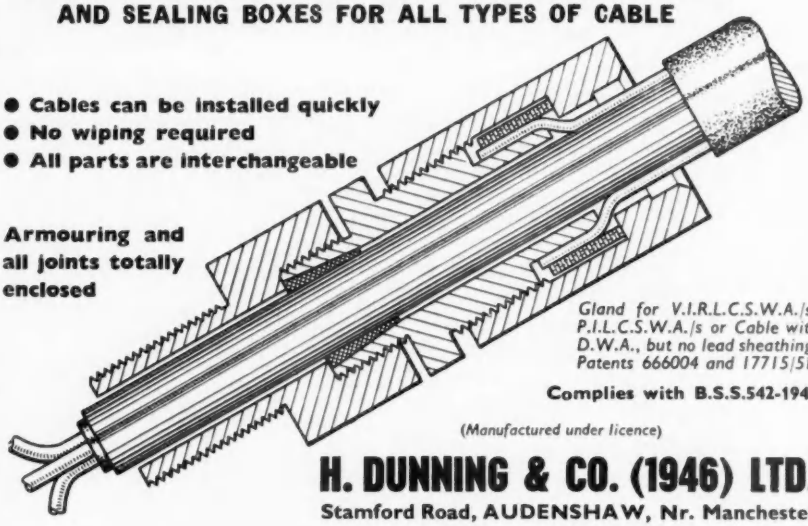
- **No wiping required**
- **All parts are interchangeable**

**Armouring and all joints totally enclosed**



*Gland for V.I.R.L.C.S.W.A./s; P.I.L.C.S.W.A./s or Cable with D.W.A., but no lead sheathing. Patents 666004 and 17715/51.*

**Complies with B.S.S.542-1947**

*(Manufactured under licence)*

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**BARNET, HERTS**
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'CRESSALL' Back-of-Board Sliding Resistance with bevel wheel drive for fine regulation—with Hand-wheel and Dialplate for mounting.

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**"Cressall" Sliding Resistances are manufactured in an immense variety of types and sizes to meet every known requirement. Every "Cressall" resistance is of sound design and incorporates the best possible workmanship — yet prices are competitive.**

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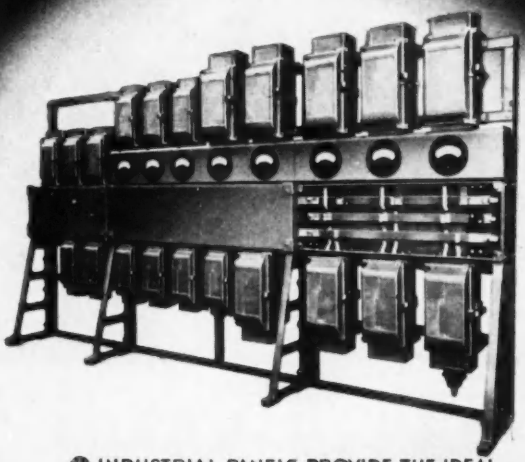

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"Belling" visible cooking

**Nothing is easy** to sell these days, but some things are easier than others, some cookers for instance! 47ABs have never stayed long in your stockrooms, and the way our own stocks are diminishing it appears that they're selling as well as ever, and that our advertising is bringing in fine results. If you can't supply from stock, let us know and we'll send you one right away.

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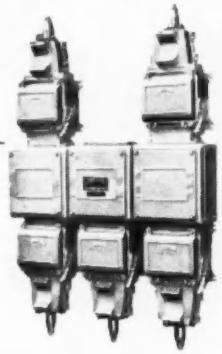

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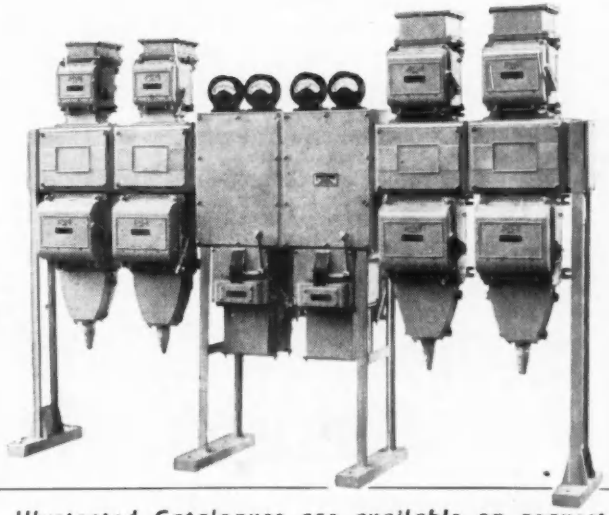

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*'Perspex' is the registered trade mark of the acrylic sheet manufactured by I.C.I.*

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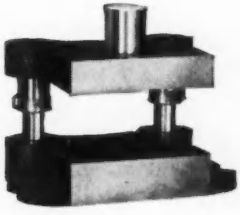
. . . who commands the ship? The "Old Man" may be a dab hand with the shovel, but he hasn't earned the scrambled eggs on his cap for that. And *mutatis mutandis* (as the boxer said when he led with his right) the fact that a skilled toolmaker can make a perfect Press Tool Set does not mean that he should waste his time doing so. Each man to his job. The skipper to the bridge and the stoker to his fires; the toolmaker to his tools — and Desoutter, those eminent specialists, to the Press Tool Sets.

***It is quicker and cheaper to order your* PRESS TOOL SETS *from* Desoutter**



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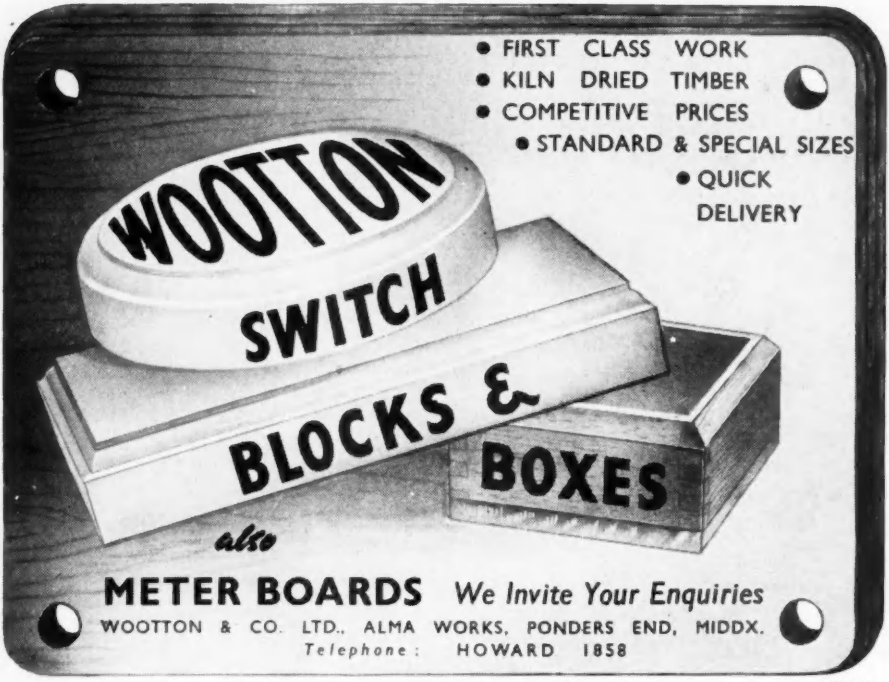


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No. 7

# *ESSEX BEAUTY SPOTS*

*The illustration and information are taken from "Journeying into Essex," by W. R. Finch —printed by S. E. Recorders Ltd., Ilford.*

## INGRAVE

THE SCENE of many peaceful Saturday afternoons watching matches played on what is claimed to be the oldest cricket ground in Essex.

*ESSEX is also the home of:*

THE METROPOLITAN ELECTRIC CABLE & CONSTRUCTION Co. Ltd.

CLYDE WORKS, CHADWELL HEATH, ESSEX

Tel.: SEVEN KINGS 1810 Grams.: METROCABLE

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*The electric Cafe Fountain shown is one of several Jackson Boiler installations in use in the store. Fitted on an island site, boiling water can be drawn from either side.*

## Further proof of 'Jackson' reliability

THE Cafe Fountain illustrated replaced an earlier 'Jackson' model which had been in constant use for many years.

Once again, therefore, 'Jackson' Boilers are being relied upon to give good service in the catering section of this store.

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First-class materials, an outstanding design and, above all, highly skilled craftsmanship amply justify the confidence of experienced buyers who always insist on a 'Jackson'.

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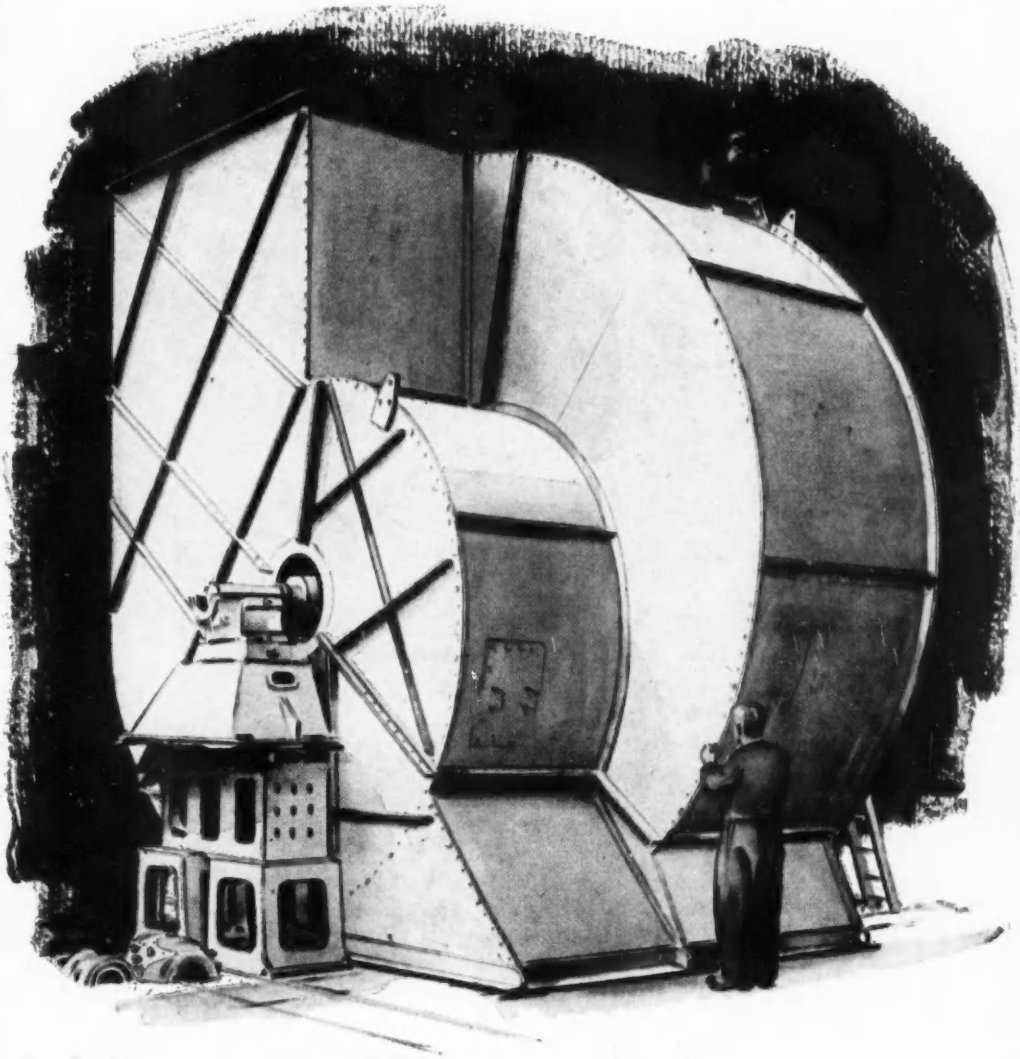
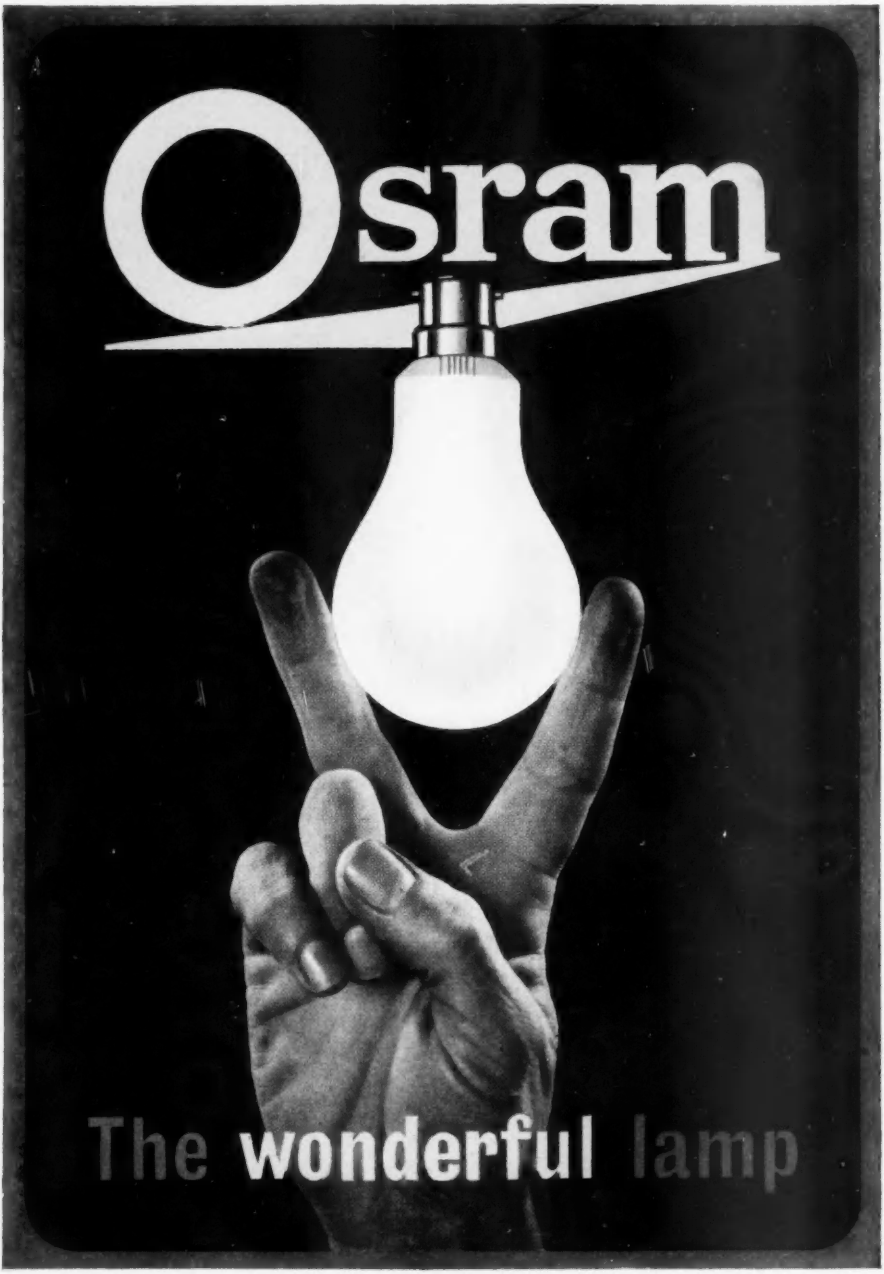


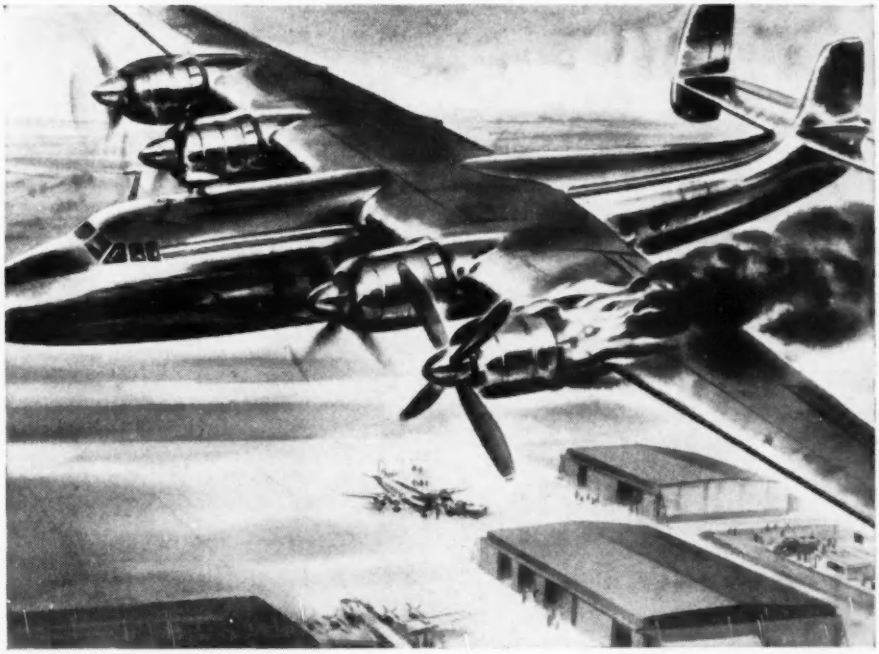
*Under construction: Howden single-inlet induced draught fan with integral scroll-type dust collector and steam turbine drive, for Vanderbijlpark, South Africa.*

JAMES HOWDEN & COMPANY LTD., 195 SCOTLAND STREET, GLASGOW, C.5, & 15 GROSVENOR PLACE, LONDON, S.W.1

# HOWDEN




THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2



**Once this would have meant almost certain disaster . . .** Today it probably means no more than an extra job for the ground staff—for modern multi-engined aircraft will fly with one or more engines shut-down . . . provided the controls to the remaining engines are intact. This is one reason why most aircraft use 'Fibreglass' insulated Pren* cables which stand up to direct exposure to flame. Other reasons—which apply to all 'Fibreglass' electrical insulation—are less weight, less space, greater heat resistance, higher safe working-temperatures, freedom from alkali with consequent resistance to moisture. All of which mean longer life and greater reliability.

**'Pren' cables incorporate one or more layers of braided glass fibre and are finished with a fire-retarding lacquer.*

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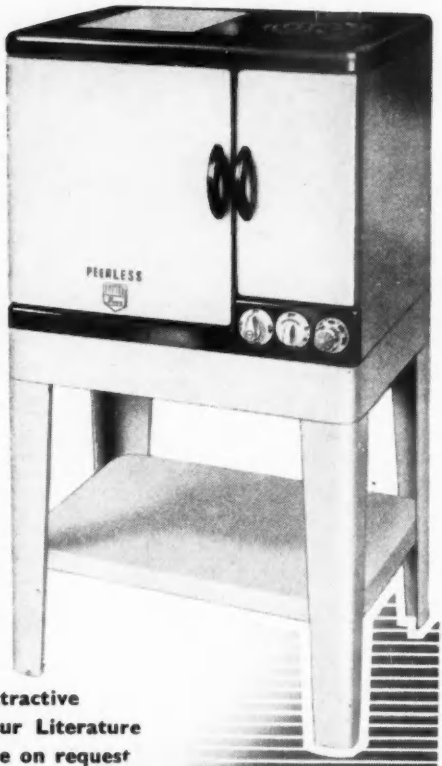

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From a few ounces up to 5 tons; good machining properties.

**NOMAG Properties:**

*Resistivity:*
150 *microhms per cm cube*

*Resistance-temperature coefficient: between* 0°*C and* 100°*C per* °*C* = ·00045

*Maximum magnetic permeability* 1·03

*Physical toughness* — *Izod value* 29 *ft., lb.*

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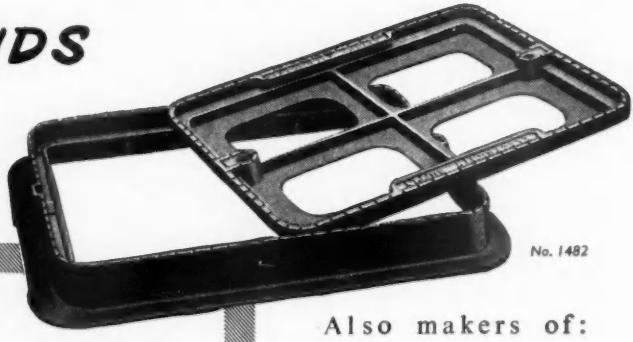

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M-W.101

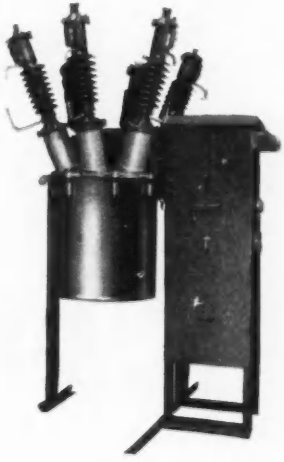
TYPE 'RPO 31' OIL CIRCUIT BREAKER

for 33 kV. OUTDOOR service

*The operating mechanism can be of the hand or motor wound spring, solenoid, or pneumatic type with or without auto reclose features.*

*Other features include a large oil-level indicator on each bushing and ample accommodation in the operating kiosk for the small wiring circuits and relay equipment if required.*

**Fully tested by the Association of Short-circuit Testing Authorities.**



The 'FERGUSON PAILIN' Type 'RPO31' Oil Circuit Breaker is a compact frame-mounted unit designed for 22 kV. and 33 kV. outdoor service.

A notable feature of the unit, providing for simple yet robust construction, lies in the utilisation of the kiosk framework as a supporting member of the top plate, with its terminal bushings. This, together with the employment of one tank for all three phases, ensures a minimum of floor space. The use of efficient arc control features ensures a high standard of performance, while the external 'turrets' afford ample accommodation for current transformers.

*Full information on this type of switchgear will be gladly sent on request to interested Executives and Officials.*

**FERGUSON PAILIN LTD.**

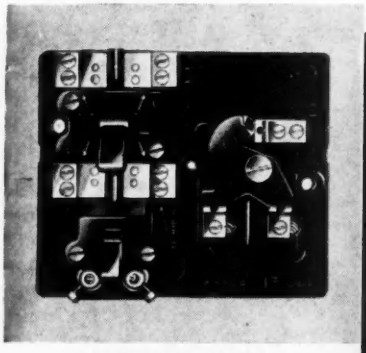
MEMBER OF THE AEI GROUP OF COMPANIES

*Switchgear Specialists*

MANCHESTER, 11. ENGLAND

# COOKER UNIT

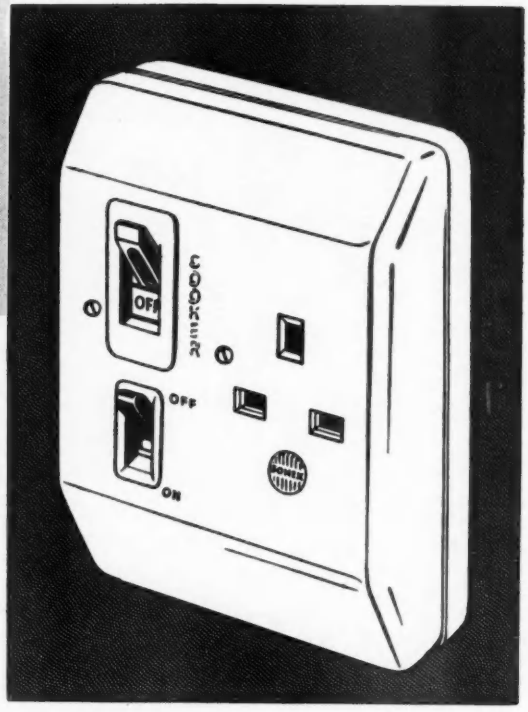
*with a famous Switch*



INTERIOR VIEW
showing the famous Wylex Switch.

Cooker controlled by WYLEX 30-amp D.P. Switch, tested to 100,000 Makes and Breaks.

B.S. 1363 Socket controlled by 15-amp. D.P. Wylex Switch.




*made by* WYLEX

# Sonex COOKER UNIT

*with the Wylex Switch*

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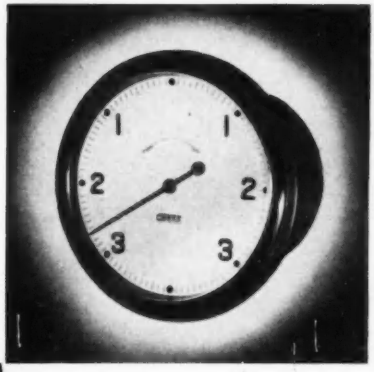
**THE GENTS' COMPARATOR DIAL,** operated from the Master Clock and the frequency supply, shows the loss or gain of Frequency time at any moment. The single, clearly read dial can be calibrated as required to suit all reasonable requirements.

*Right: Comparator Dial, available with an 8" or 12" dial for panel mounting.*



**THE MASTER CLOCK,** which is an accurate, precision time-keeping instrument, can also be used for controlling any number or size of "slave" clocks that may be installed in the boiler house gauge panel, turbine room, offices, etc., of the station, and can be fitted to give the half-hourly pulse for operating Printometers. Where impulses are also required for operating work-men's time recorders, the Master Clock can be suitably fitted.

*Left: Impulse Slave Clock available in many different sizes and styles, both surface or flush fixing.*

In fact, a GENTS' Master Clock can provide all the Standard time throughout the power station.

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*look*
*they said how*
*can you*
*possibly let all that*
*electricity loose from*
*over here I*
*said if it makes*
*you gasp it's probably*
*not so much indigestion*
*or Yogi*
*as higher elec-*
*tronics but there's really*
*nothing far-fetched about*
*telemeters and*

meters are matters for

**MEASUREMENT**

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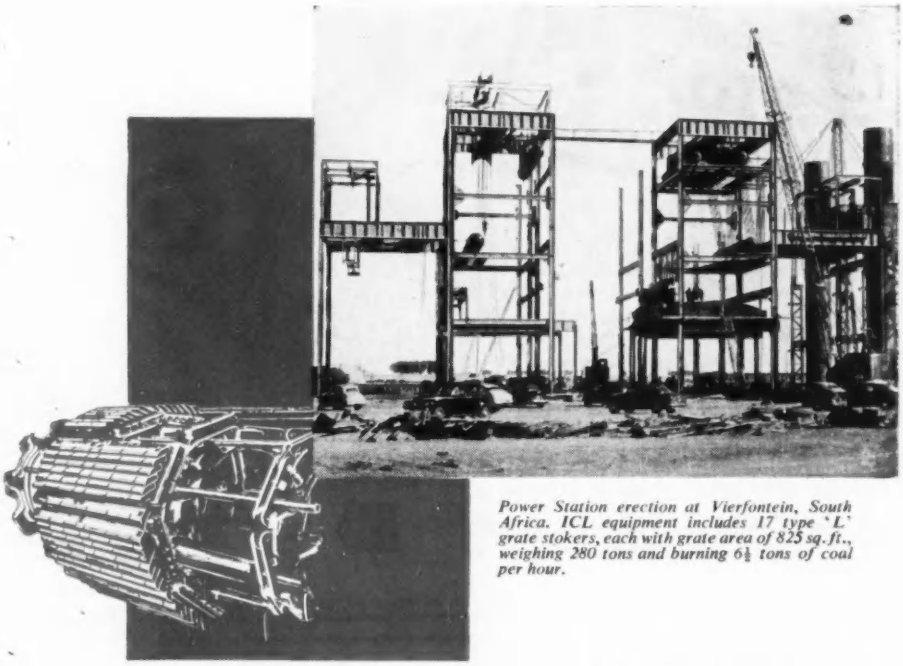

*Power Station erection at Vierfontein, South Africa. ICL equipment includes 17 type 'L' grate stokers, each with grate area of 825 sq. ft., weighing 280 tons and burning 6½ tons of coal per hour.*

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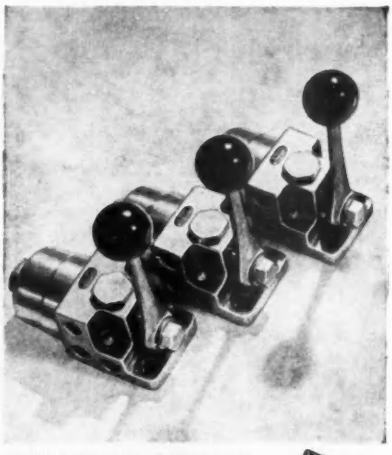

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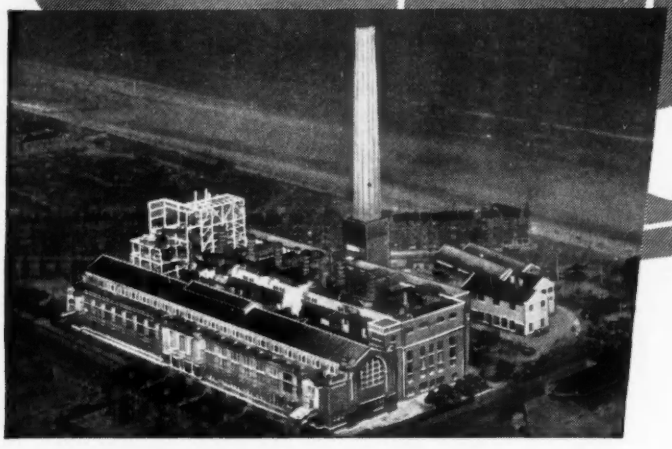

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*Photograph by courtesy of the C.O.I.*

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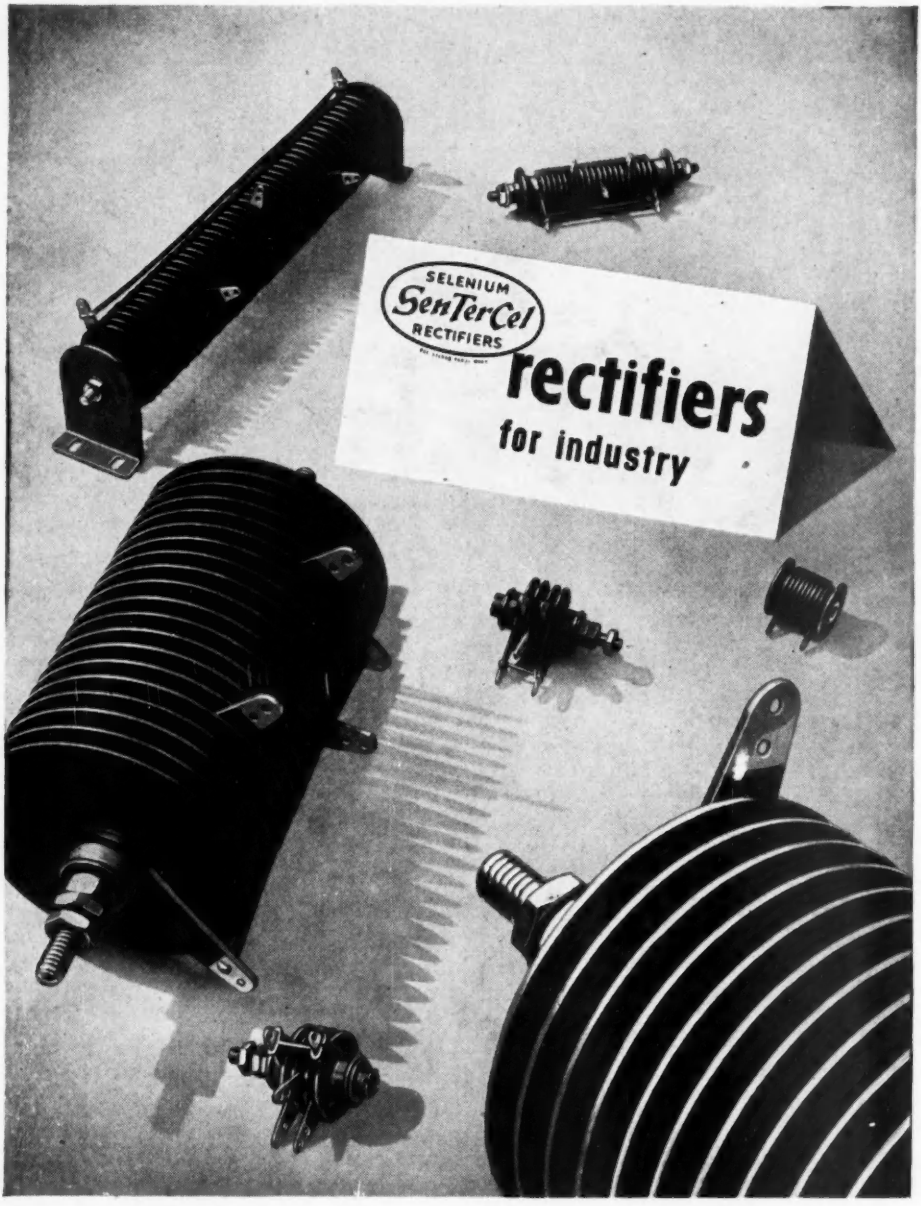


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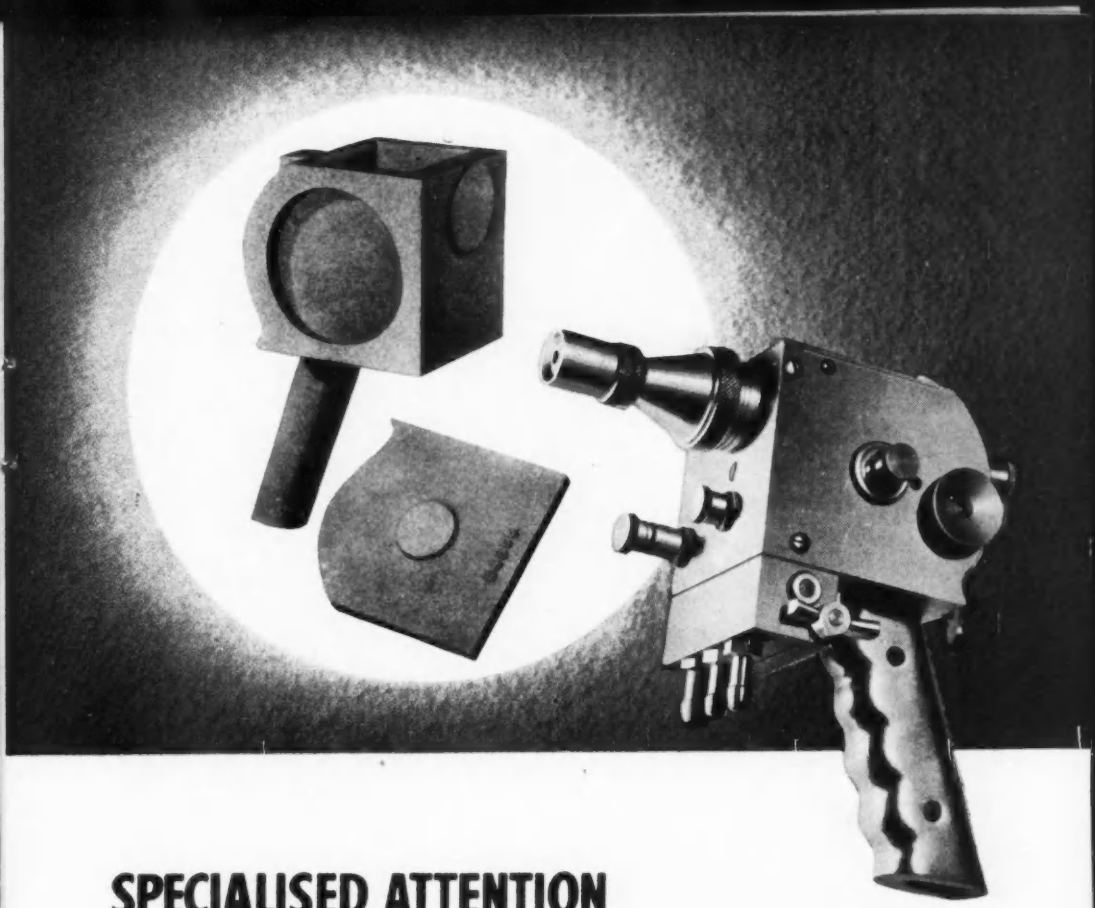

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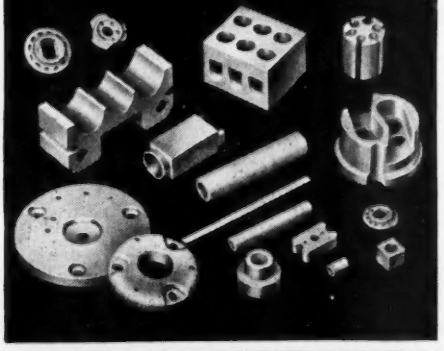

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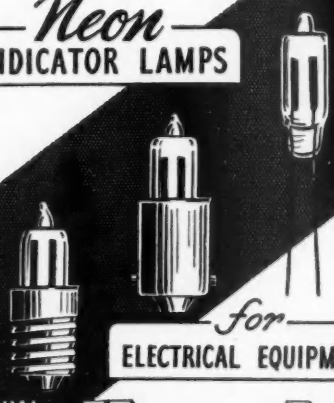

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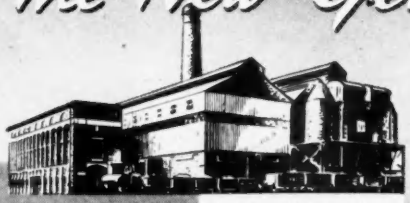
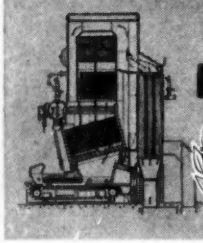


North Tees "A" Power Station



1917 BABCOCK 1952

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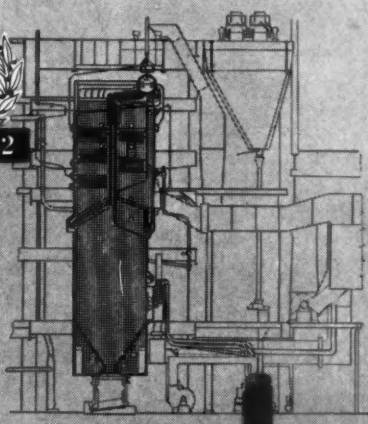
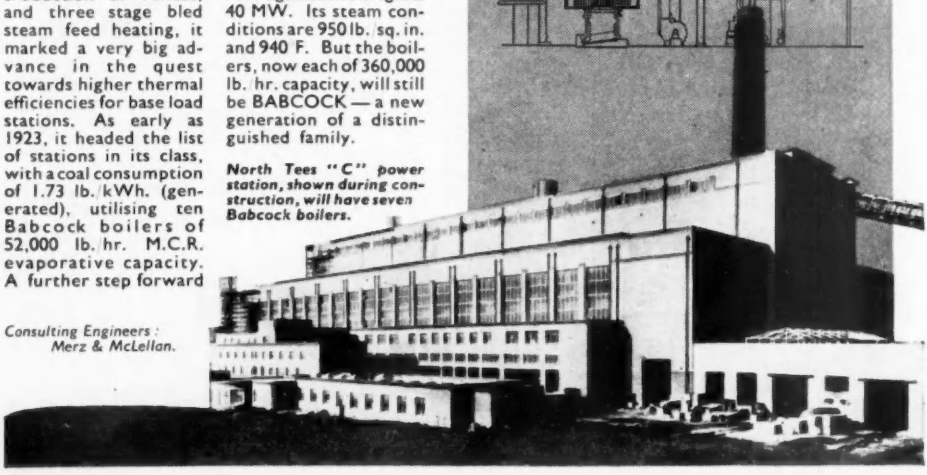


***North Tees "C" power station, shown during construction, will have seven Babcock boilers.***



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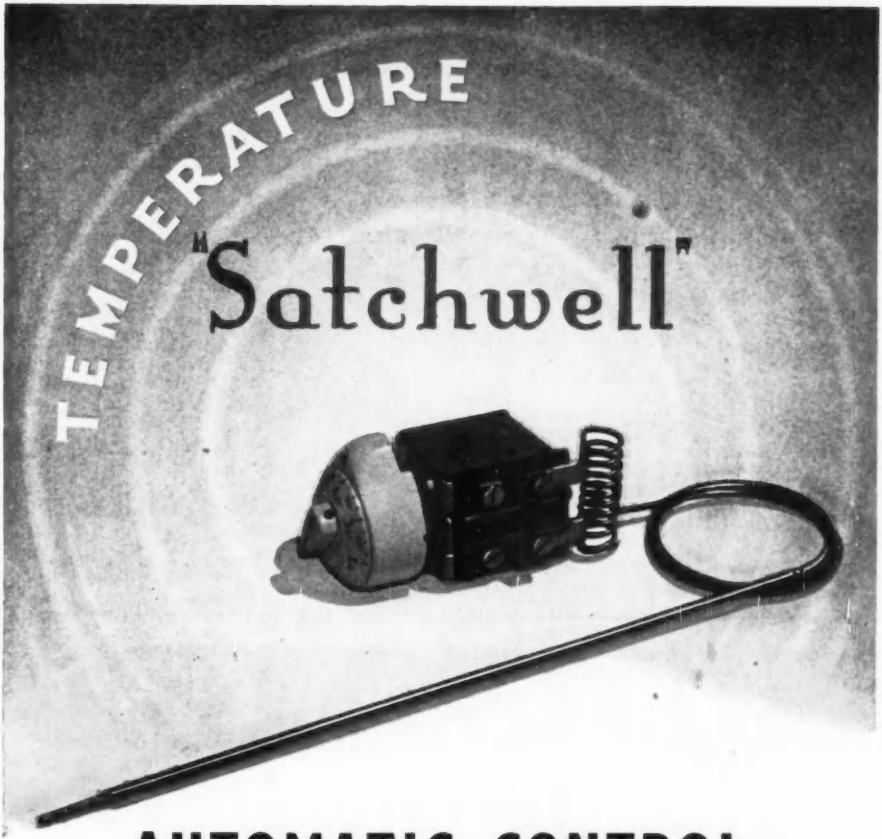


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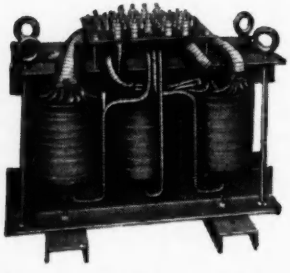

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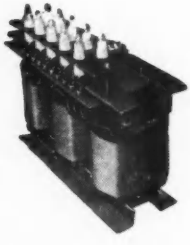

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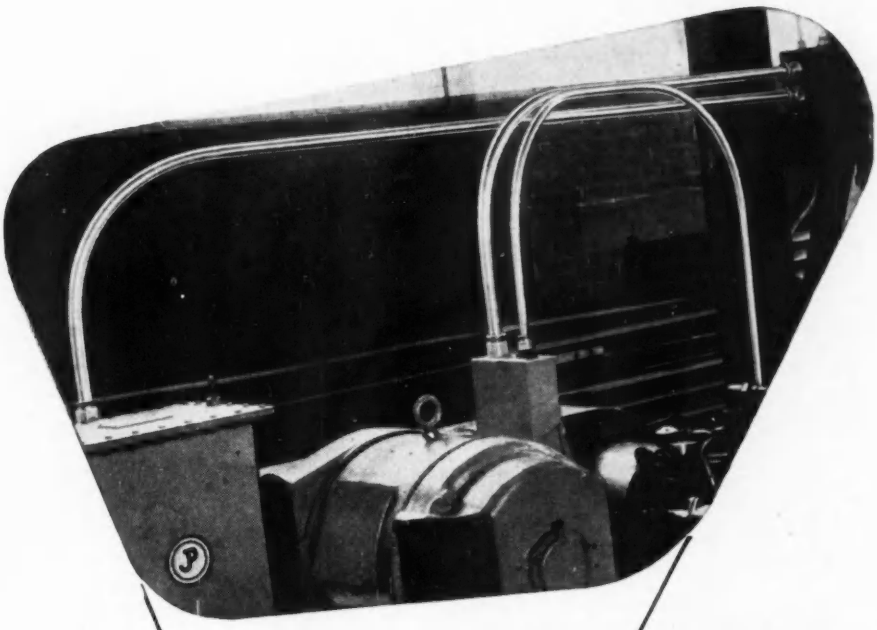

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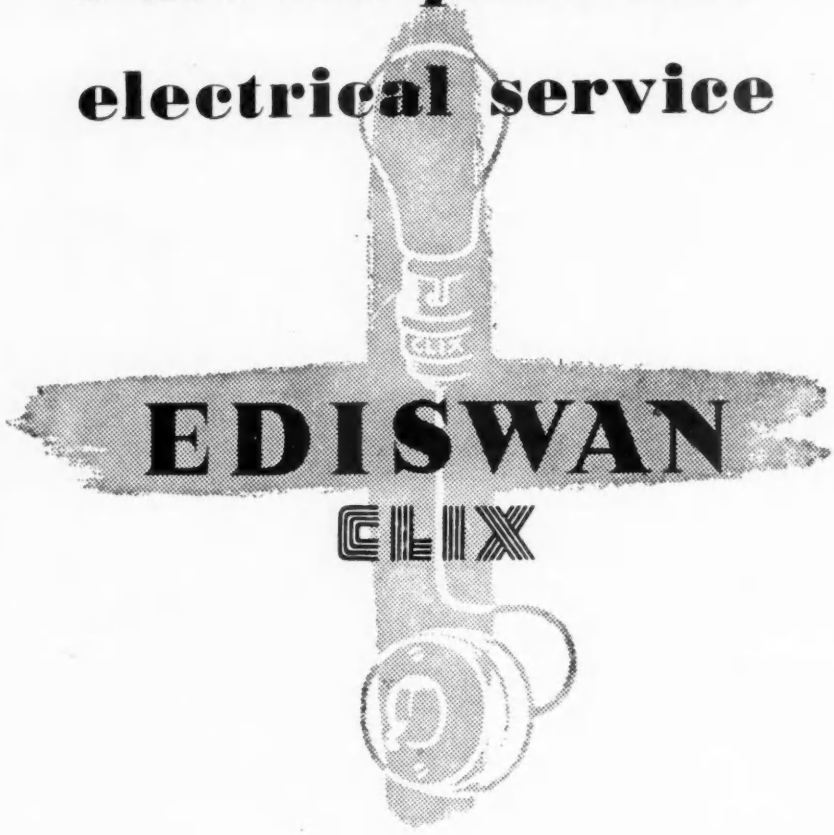


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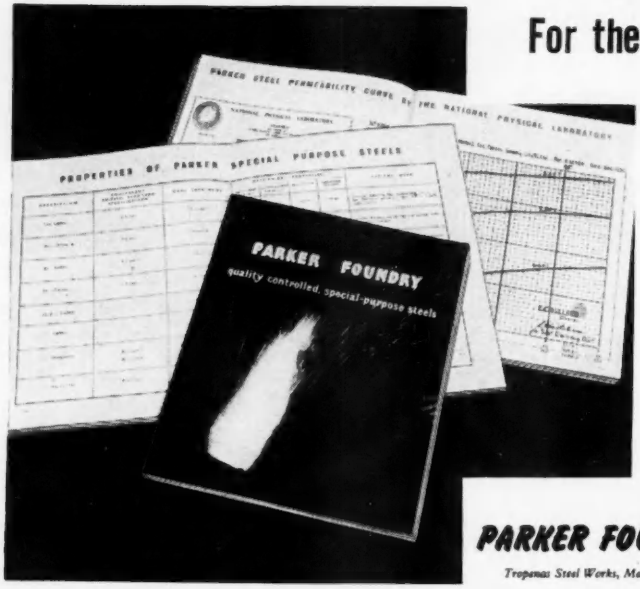


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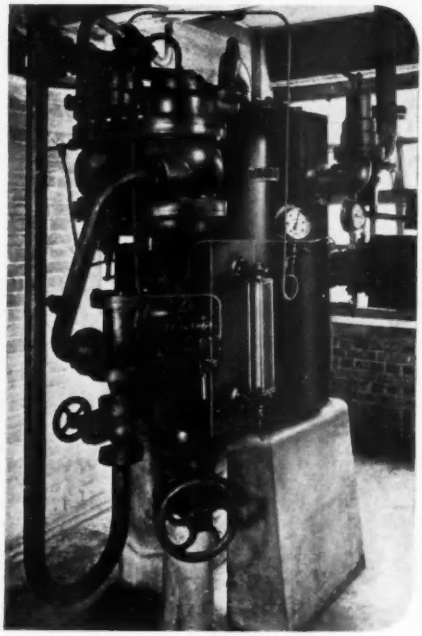

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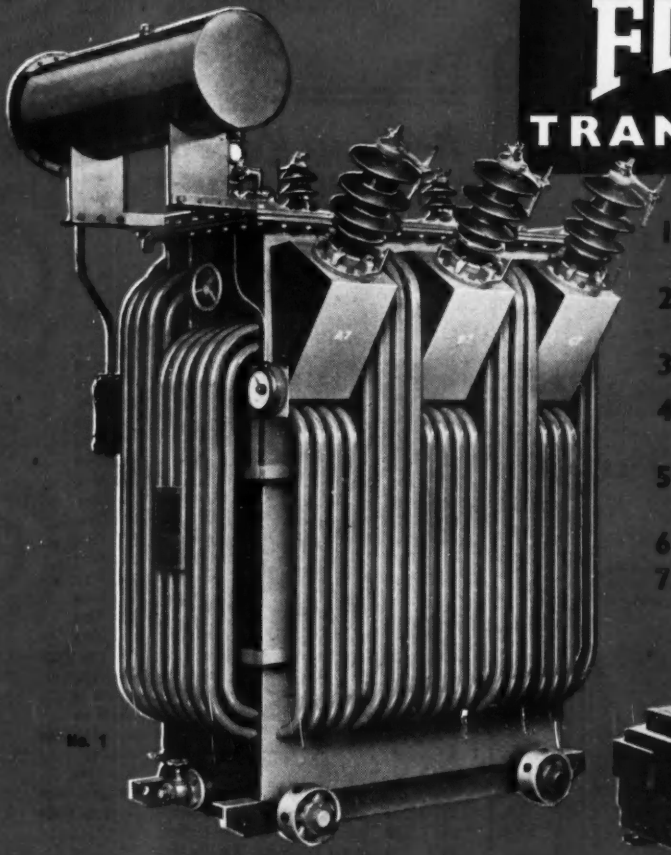

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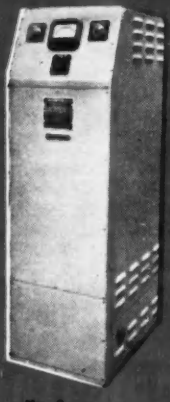

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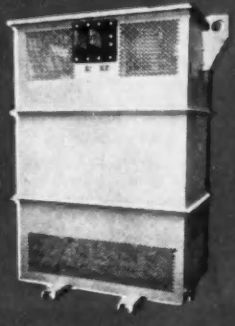

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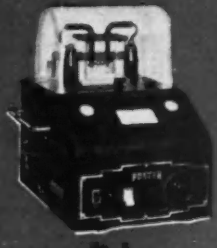

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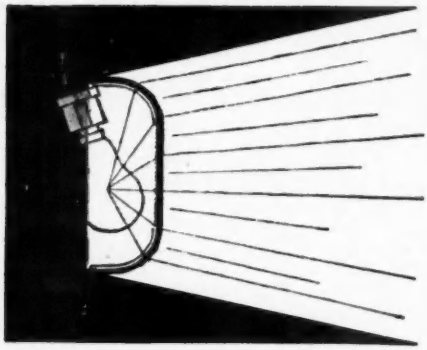

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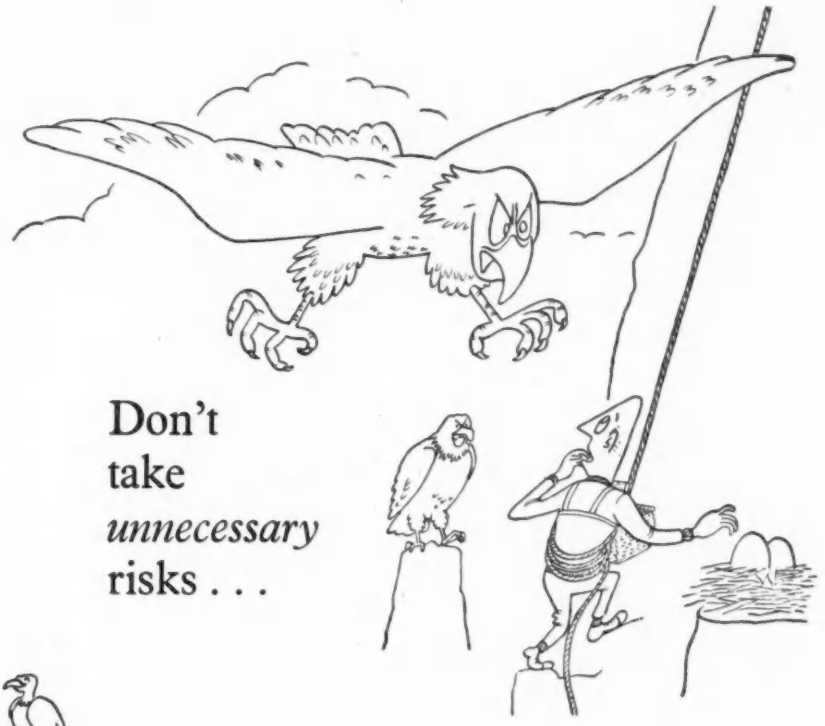

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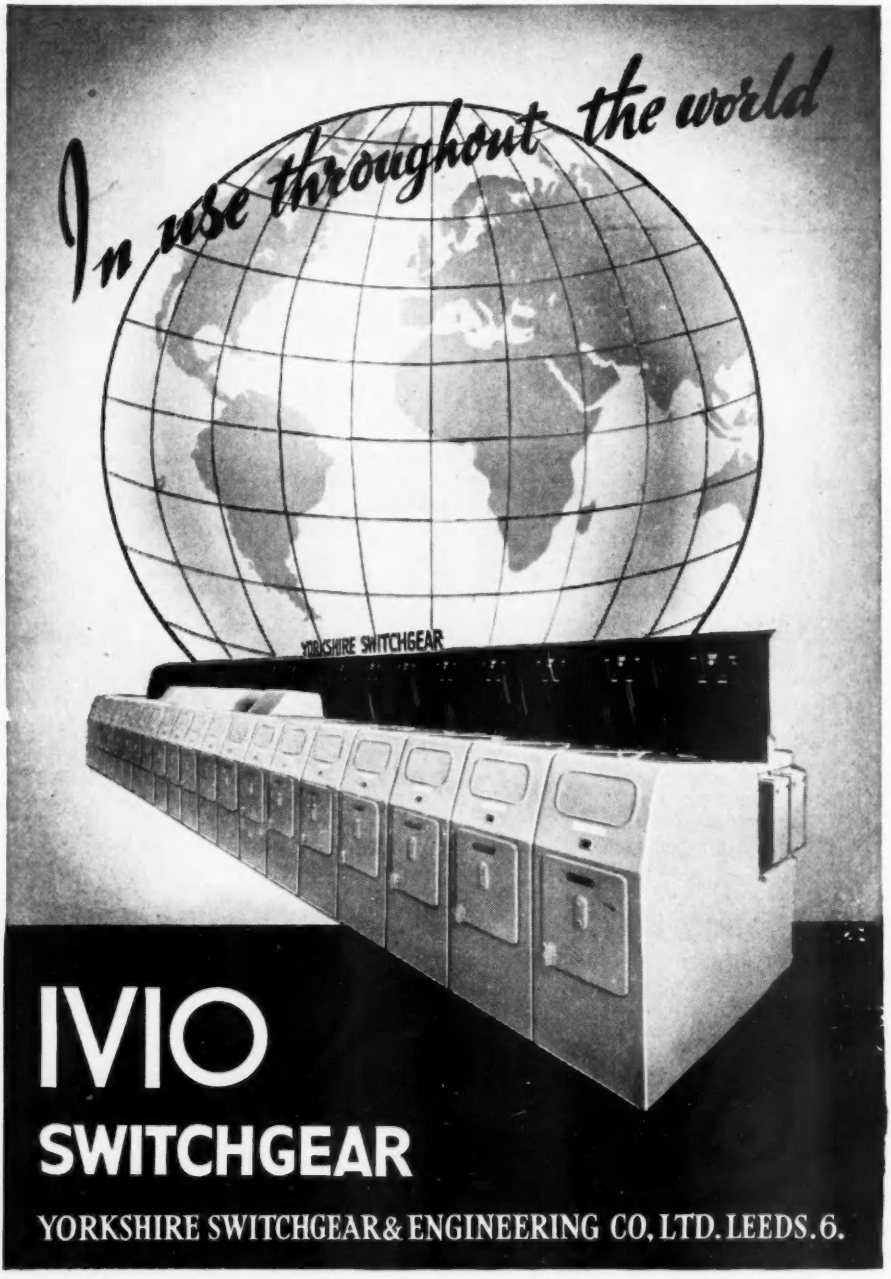


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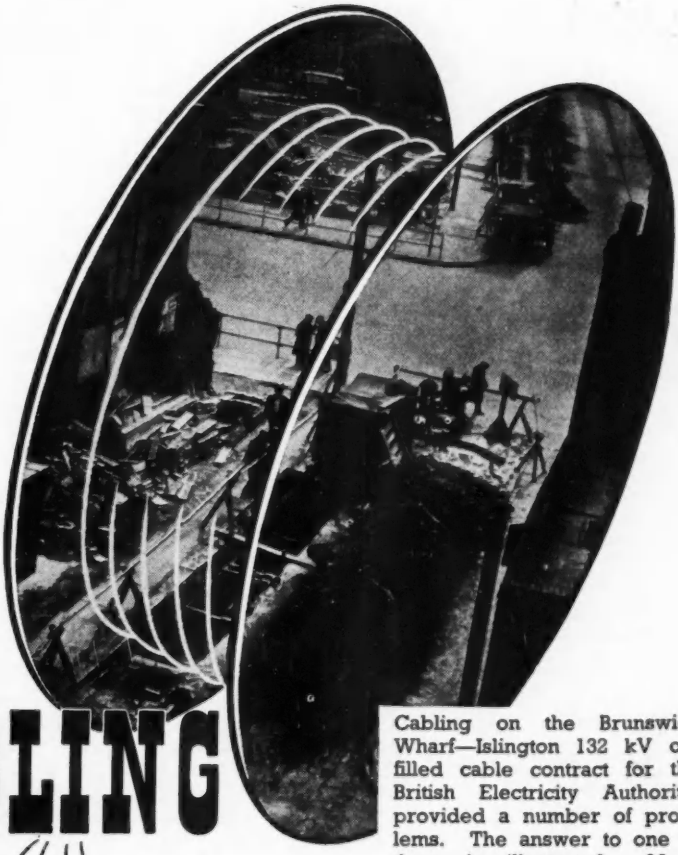

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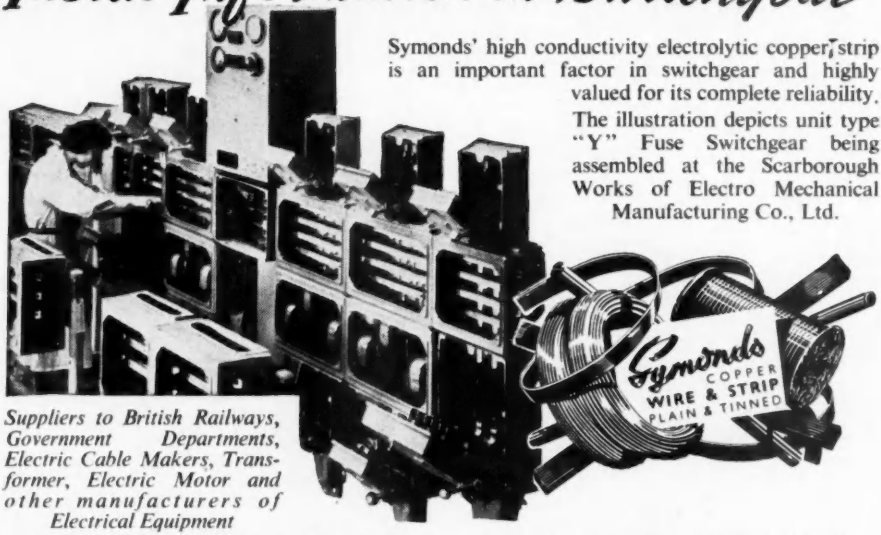


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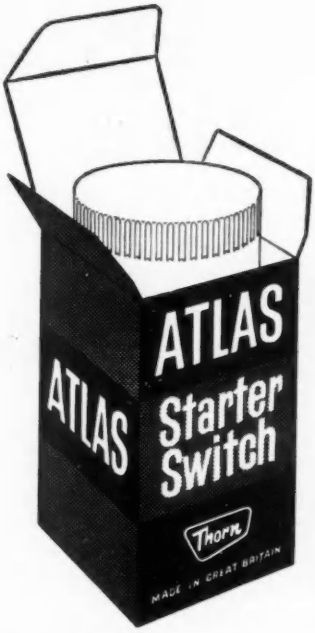


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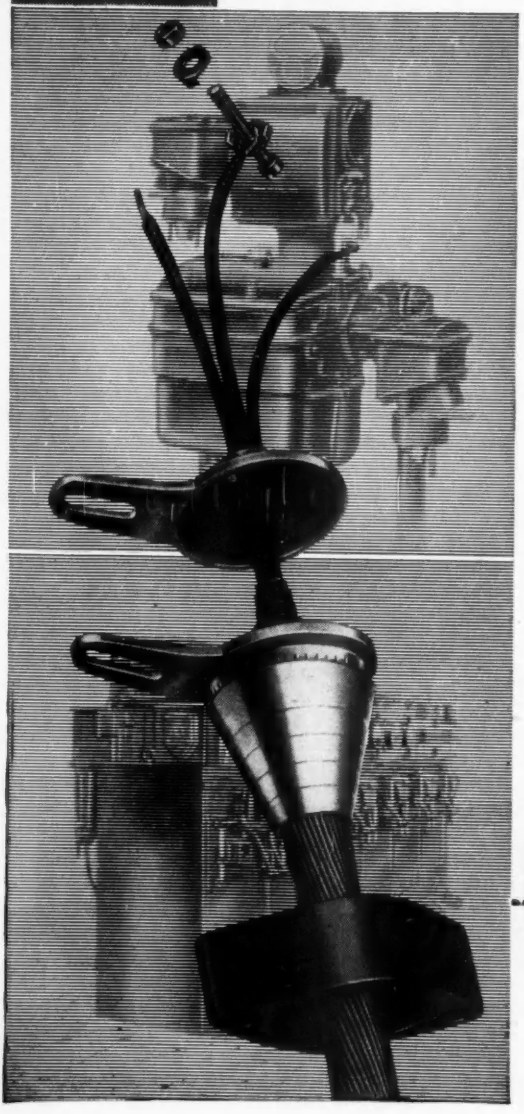

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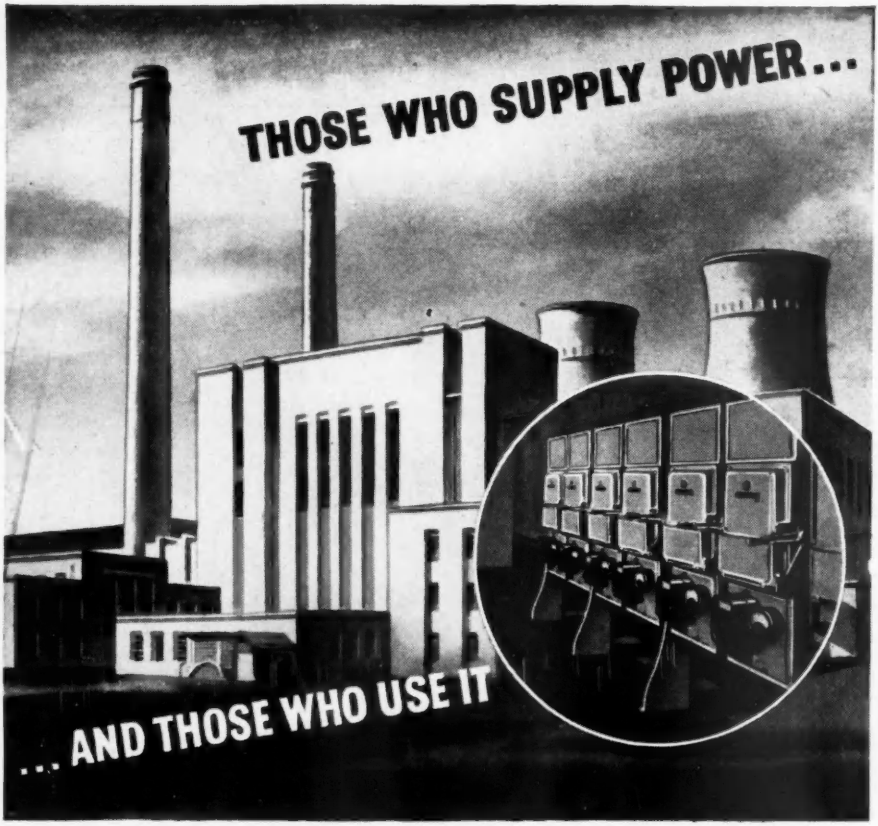


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# Editorial

## *PREPARING THE WAY*

A FEATURE in the statement of electricity's case in the fuel-for-heating controversy has been the increasingly wide audience approached. From purely electrical circles, the arguments in favour of the use of electricity have been directed successively and with increasing confidence to engineers in general, and then to the public as a whole. The most recent article of this series appeared last week in the columns of the *Financial Times*, and it is one which most ably demonstrates the strength of the points in electricity's favour. Written by Dr. P. Dunsheath, its effectiveness is undoubtably increased by his high repute in educational and scientific, as well as purely engineering, matters. His attractively unrepentant statement of the advantages of electricity—it is too positive to call a defence—is particularly well timed, for the Ridley Committee's report on a national fuel policy is expected to be published in the next week or two. The recommendations it makes will be considered in the light of the attitude to electricity existing then and later, and the work of Dr. Dunsheath, as president of E.D.A., and of the many other protagonists of the electrical way of life has ensured that this will be far more favourable than it was when the committee was set up.

## *REPORT IN ACTION*

ELECTRICITY supply was the first of this country's national monopoly industries to send investigational teams to the United States under the Anglo-American Council on Productivity programme. The teams that went produced a bulky report of their experiences, and now, two years after its publication, an attempt has been made to evaluate its effect on British practice. It is not to be expected that all the new features of supply industry working which are found to agree with the recommendations made by the teams, have indeed been inspired by their comments. The levelling-up in standards which was part of the reorganisation consequent on nationalisation would have resulted in the adoption of many such changes even had no trans-atlantic trip been made. Nevertheless, there is evidence that the report effectively suggested a new approach to many of the problems common to the two countries. Although startling alterations in technique are, not suprisingly, absent from this list, the report has been outstandingly successful at a lower level. Because of its wide dissemination in the divisions of the B.E.A. and amongst the area boards' staff, it has induced many engineers and other officials to consider afresh their own methods of solving the problems which it discusses. Such critical examination is a sound basis for increased efficiency and improved productivity.

## *SWORD AND PLOUGHSHARE*

EXPERIENCE in the last two wars has shown that, as the needs of the fighting services grow more technical, the incidental contribution made to peaceful advancements by their satisfaction increases. Radar and air transport are but two instances that spring to mind, and the list seems to be in process of extension in the course of the present rearmament programme. In the newly published evidence presented to members of the Select Committee on Estimates which examined expenditure on various rearmament projects, there are several instances of work on defence development which will eventually greatly assist electrical technology. Probably the extreme example of this is in relation to "atomry," as one witness described nuclear developments. In this field it was estimated that about 90% of the research effort is common both to the development of weapons and to such peaceful uses as electricity generation and the medical application of isotopes. Even the

large production establishments which are being set up to process uranium concentrate and so produce plutonium are apparently assured of several years of useful work in the service of the power reactor programme should the atom bomb be banned tomorrow. Such hopes of future usefulness serve as some minor compensation for the large but unstated sums of money which are being expended on this work. Meanwhile, as our review on another page shows, the electricity industry which may eventually benefit is at present playing a major part in facilitating its fulfilment.

## *ECONOMICAL SALARIES*

IN its report, the Select Committee raises a nice point of the true economy of salary scales. Complaints about rates of pay in the scientific civil service, both in absolute amounts and in comparison with other branches of Government employment, have been common for some time. The Committee approaches this question from a consideration of the great sums being spent on complicated equipment of the highest quality for the purposes of research and development, and asks if it can be good business to risk failure to attract the best brains to use this apparatus by niggardliness in regard to salaries. It is reinforced in its conclusion that this is not so by the admission of the directors of some official research establishments, that the Government is in the present situation effectively relying on the technologist's willingness to sacrifice some financial advantages for the satisfaction he obtains from his work. As a result, there is included in the report of the Committee a strong recommendation that scales of salary should be kept under constant review, with the inference that they should be bettered at an early date. If action is eventually taken on this recommendation, the results are likely to be widespread in their effect, for in this field, the published civil service rates affect the scales paid throughout industry.

## *CONSUMER PROTECTION*

SWITCH and fuse gear of adequate breaking capacity and efficient earthing systems are universely recognised as essential requirements for electrical safety on consumers' premises. The degree to which the supply authority's co-operation is involved in ensuring their effectiveness is not so clearly realised. System fault MVA must be kept below a convenient maximum for a number of years if adequate switch rating is to be economically reasonable, and substation earths must be low enough in resistance to allow some margin for the consumer's earth connection so as to ensure prompt operation of protective apparatus on earth faults. These aspects of service to the consumer receive detailed attention in the latest edition of the annual report which Mr. Swann prepares on electrical safety, and it is apparent that both are going to prove expensive items in the years ahead. Agreement on a maximum value of fault MVA at each voltage within an area, and publication of this figure, can ease the first problem, while for the second the replacement of the traditional "earth plate" by deeply driven rods is a step which may prove surprisingly effective. Even this may prove insufficient, however, and eventually recourse may have to be made to such devices as differential current relays for all consumers' premises.

## *PRODUCTIVE VISION*

IN recent years, films produced for E.D.A. have established for themselves a high reputation as aids in general education. Now the Association is considering a new series of productions aimed at industry, with the intention of bringing forcibly to the notice of management and work people the advantages that electricity can offer in factory and workshop. A forerunner of this type of film, released last week, suggests that the existing standard of production will be maintained in this new venture, which will be of more detailed interest than those made for industrial showing immediately after the war. The relationship between degree of electrification and productivity has frequently been demonstrated, so the circulation of new films of this type will be a valuable service to the country as a whole, as well as to the narrower interests of the electricity industry.

Meteor

# *Repair and Maintenance of* SMALL ELECTRIC TOOLS

## *Testing and repair of field windings is discussed in No. 3 of this series* by KARL WILKINSON

THERE are three major electrical parts in an electric tool. The armature, the fields and the commutator. Testing the armature is largely a job for the specialist, but the field winding is a much more simple affair and lends itself to comparatively easy testing and repairing procedures.

### *Types of Fields*

There are two normal field arrangements: the single coil (Fig. 32(a)), and the more usual two-coil field (Fig. 32(b)). The schematic diagrams show a slight difference in the connections. In (*b*) the armature is in between the two field coils and in (*c*) the field coils are themselves connected in series before the circuit enters the armature. The method (*b*) is the better because each coil can be wound with identical lead outlets. In (*d*) we have a tapped field giving speed variation, a method common in hair driers and certain mixing machines.

### *Faults*

There are four possible faults in a field winding (ignoring, of course, a sound but incorrect winding, e.g. incorrect voltage range): 1. Earth to frame; 2, Open circuit; 3, Short-circuited turns; 4, "Flying" opens or shorts.

Faults 1 and 2 are so simple that we need not deal with them. Faults 3 and 4 are, however, a far different matter, and cannot always be determined easily. They can usually be found by the following tests, but the flying shorts and opens are nevertheless always a source of trouble to the repairer. It is easy to say "When in doubt rewind." This might not be possible at the moment and a repair may be the only alternative.

Assuming a coil assembly as in Fig. 32(b) with each coil earth free and both circuits continuous, we can test them in the following ways:— 1, By inspection and smell; 2, By taking the ohms on each coil, using an ohmeter or voltmeter and ammeter; 3, By a volt drop test on each coil using low volts (from battery or accumulator); 4, By a volt drop test using ¼-½ rated line volts; 5, Wattmeter test on each coil.

The first test is so obvious that it is usually omitted in text books. It is nevertheless the first approach to the problem. Test 2, using an ohmeter, is a very simple check but it may not find a faulty coil because the loading of the coil is too light. It will, of course, immediately detect a dead shorted coil.

Test 3 is an old favourite, but it is not very efficient because of the reasons mentioned above. Test 4 is by far the better method, if done carefully. For Fig. 32(*b*) the brushes should be removed and the two field ends going to the brush boxes shorted together. 50-100 V is impressed on the field circuit and the volt drop measured across each coil. A transformer is the obvious method of obtaining the requisite voltage, although a line resistance could be used instead.

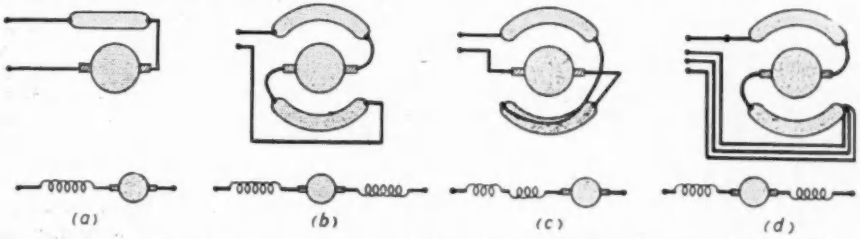



*Fig. 32. These sketches show armature and field winding connections. One coil of (d) is tapped.*

The field coil will become hot very rapidly in this test and the reading must be taken quickly—it only takes a few seconds to read a meter. The readings should, of course, be equal for this type of machine, and the value of this test lies in the loading of the coil beyond its normal current rating, causing any weak places to break down, so giving a different volt drop on each coil. *Prolonged testing will, however, damage a sound field.*

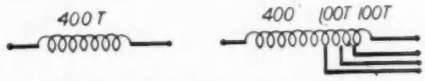



*Fig. 33. One maker's arrangement of tapped fields. Additional turns on one coil only*

The fifth method, taking the loading in watts on each coil, is the best of all, but a wattmeter is seldom available to the average repairer.

There is still another method of testing the coils (after removal from the stampings), but as it requires special apparatus we cannot deal with it here.

For the schematic diagram in Fig. 32(*c*), the jumper between the two field coils will have to be bared to enable a volt drop to be taken. Testing the arrangement in Fig. 32(*d*) can be a problem as the two fields are not the same. It is of little use to take the ohms as these are seldom known to the repairer unless he has previously had a number of similar machines to attend to; moreover, apparently similar machines vary considerably in their ohmic value. Similarly the volt drop or watts will vary with each tapping. One point may help

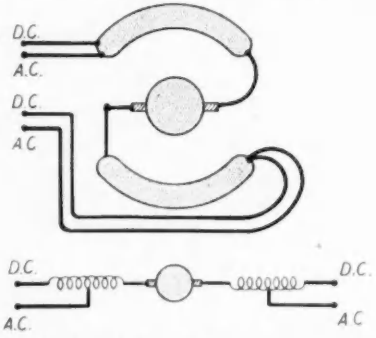



*Fig. 34. Four leads come from the two field windings of this universal motor*

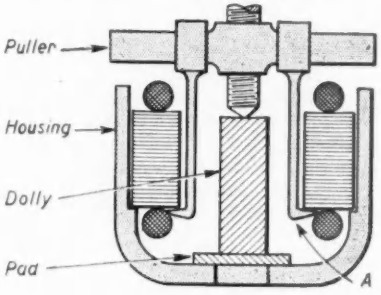
in this testing: it is usual in these tapped fields to have the two field windings identical, or nearly so, with additional turns on one field only. That is to say, the smaller field will be similar to the high-speed tapping on the larger coil. Fig. 33 shows one maker's arrangement for a tapped field.

One other type of field should be mentioned here. While most universal motors operate quite well on both d.c. and a.c. (hence their name), certain series motors will have four leads emerging from them for a.c. and d.c. operation (See Fig. 34). These fields are usually similar, i.e. each one has a tapping, consequently testing is as before only here we are dealing with two circuits.

## *Repairing*

Simple faults on these universal fields are often quite straightforward to repair. It will, in all probability, be necessary to remove them from the stampings and this operation depends on: (1) Their general condition; (2) whether they are tight on the stampings; (3) the type of varnish used; (4) whether the field stampings can be reached while in position or removed from the tunnel housing.

*Fig. 35. Special set-up for pulling out field assembly, using a pulley drawer*




As to their condition, a coil partly charred and brittle would obviously not be repaired but replaced with a new coil. In (2) many fields are inserted in their stampings while in the "white" and varnished afterwards. If they are also a close fit on the poles it will be very difficult to remove them without damage, and in any case the varnish used is the determining factor. Most varnishes used on this type of winding are capable of being softened by heat. If a suitable current is passed through each field, it will become hot and soften in a few seconds, so allowing it to be removed. Do not attempt to bend them while cold as damage might be caused.

## *Removing the Assembly*

It is the general practice now to have the field stampings crushed in an aluminium or die-cast housing, or fixed into it either by bolts

or by set screws passing through the housing wall. *Beware of these set screws; at least one maker places them under the name plate*, so concealing them from casual view. It is nearly always necessary in order to repair a field to withdraw the stampings from the housing which, moreover, frequently has a blind end, so preventing access to one end of the field coils. This withdrawal might be quite easy or

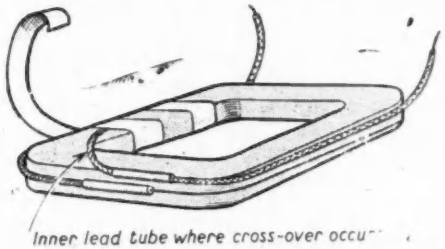



*Fig. 36. Positioning of joints between winding wires and flexible leads*

extremely difficult. Most of them will drop or jar out if the housing is warmed slightly, allowing it to expand. If this is not sufficient the field assembly will have to be pulled out—an operation that in certain circumstances might damage an otherwise sound coil. This operation requires a special set-up, shown in Fig. 35.

The reader will notice that a popular type of pulley drawer has been used, with the jaws reversed. These jaws will only just engage under the stampings at A. The dolly enables the full length of the screw to be used. When drawing a very deep field the dolly will have to be changed at times for a longer one. Heat on the housing will help enormously with maybe a *little* penetrating oil run in on the inside of the housing.

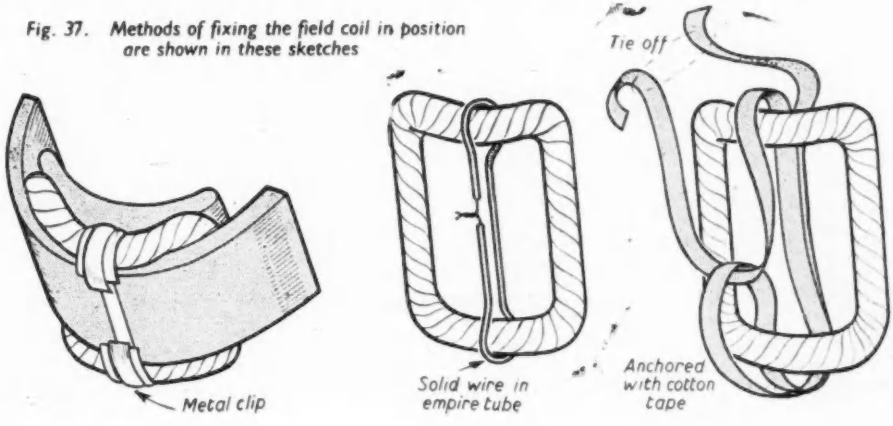
Field stampings can occasionally be punched out by passing a drift through the ventilating holes in the blind end of the housing. This is not always a good method as the stamping stack can be easily distorted.

After removal they are untaped and prepared for repairing, retaping and reinserting. The repair may only necessitate new tails being fitted, retaping to improve insulation, or some other minor repair that does not demand a complete rewind. It must be remembered that coils impregnated with certain synthetic varnishes will not soften with heat and their removal will mean destruction.

One or two points must be dealt with here. First and foremost, never use black adhesive tape to tape field coils. Its insulating qualities are very poor and a little oil will convert it into a terrible mess. It can however be used under a plain cotton tape, either to cover a joint or to protect the coil, mechanically, from chafing on the stampings in certain places. Plain cotton tape, $\frac{1}{2}$ in to $\frac{5}{8}$ in. wide is normally used on these coils, and failing the correct tape the local haberdasher will furnish a similar material that is quite suitable but usually a little coarser and of poorer quality than that used by the manufacturer. For very small coils in a restricted space (e.g. fields from very small hand tools driving small emery wheels or "burrs") silk tape can be substituted for cotton. Conversely, oiled linen tape can be used if there is plenty of room. Oiled linen is, however, not so good as a plain tape varnished after completion.

All joints between the flexible and the winding should be remote from the point of exit of the flexible lead so that the joint can be firmly taped to the coil and prevent any pull on the tail being imparted to the joint and thence to

*Fig. 37. Methods of fixing the field coil in position are shown in these sketches*



the fine wire. (See Fig. 36.)

Once the field has been repaired and retaped it must be varnished to obtain a sound job. (Cotton tape alone is also a poor insulator, but with a coat of varnish becomes excellent). Failing the correct varnish, ordinary shellac will serve but *do not use the machine until the varnish is quite dry.*

### *Replacing the Field*

A repaired coil will probably require heating again to enable it to be refitted to the pole. If space allows, always insert a layer of insulation under the coil where it presses on the stampings. Once in position the coil will require fixing, either with a strip of metal hooking it back or by one of the two methods shown in Fig. 37.

### *Rewinding*

Should the coil be beyond repair the winding of a new one generally presents little difficulty, and in contradistinction to armature winding, demands very little equipment or experience. On the other hand, while many fields are an easy fit on the poles, some are exceedingly tight and with the available end space restricted by the proximity of cooling fans on the armature or by the brush gear, will require more careful copying.

### *Copying the Fields*

The field removed from the pole will supply information for the new one. It should be flattened—roasting it in a flame if too hard—to obtain the initial outline. The taping is removed and the coil measured as in Fig. 38. From these dimensions the former can be made. (See Fig. 39.)

Sides A and B (Fig. 38), are usually easy to measure but it is advisable to increase them slightly (by $\frac{1}{16}$ in. to $\frac{5}{32}$ in.) because of two factors: (*a*) A coil always "shrinks" (distorts) after removal from a former, especially after bending and reflattening, and (*b*) the makers will often use a tight coil to economise in copper.

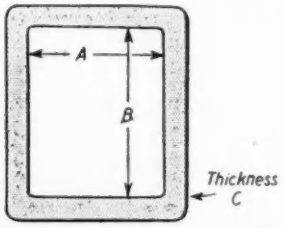



*Fig. 38. Dimensions to be measured when copying fields*

The thickness of the former C is more difficult to ascertain, by reason of the factor (a) above. To check this the coil can be gently gripped in a vice in order to restore the close pack of the original wind. The distance apart of the jaws is nearly always a little greater than the thickness of the former required.

The former can be made from any suitable material of the correct thickness and is usually of plywood. Two slots are cut to allow the coil to be tied after it has been wound. The former must have smooth bevelled sides and sharp edges to prevent the fine wire from slipping down the side. Two side pieces are required, of suitable size and thickness, with slots to correspond with the tie slots in the former.

The whole assembly is mounted on any convenient device to rotate it; a lathe, a pillar drill or even a hand drill held in the vice. The whole set-up is extremely simple, in spite of the fact that the original coil was probably wound on an elaborate machine with automatic spacing for the wire.

The wire is fed on to the former by hand, layering the wire as evenly as possible and with sufficient tension to ensure a compact coil. If

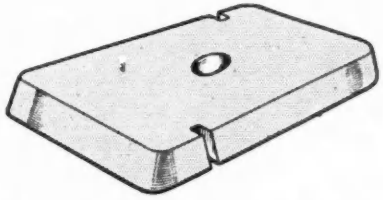


*Fig. 39. Type of former used for field winding*

the device used is turned by hand, a counter is not required. If, for example, a lathe is used, a counter will be necessary, and an ordinary revolution counter, with the star point engaging the end of the mandrel carrying the former, will serve excellently.

The former should have a rub with a candle along its sides to allow it to slip out easily from the completed coil. The coil is provided with tails and taped as described above. The process is, for many coils, extremely simple. Indeed, for some coils a jig, consisting of four nails driven into the bench, will suffice, the wire being wound round the nails by hand.

### *Difficulties*

We mentioned above that certain tools have very little space for the field winding. This will certainly give trouble to anybody who is not a professional winder and may necessitate another former being made if the first coil does

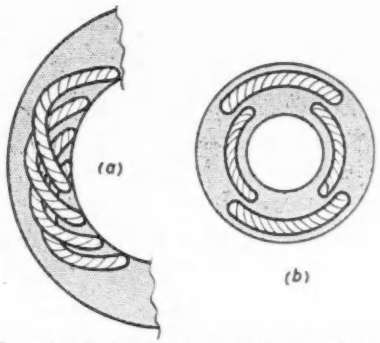



*Fig. 40. Distributed and compensated fields*

not fit. The faults shown by the first coil will enable the necessary corrections to be made.

Coils of very fine wire—say, below 0·006 in.—require more careful winding. Tension must be adequate without stretching the conductor. Similarly, very heavy wire in a field with restricted space will require very heavy tension and careful spacing for each layer.

The single pole, or rather the single coil field shown in Fig. 32(a) is often wound on a moulded plastic former. If this moulding is damaged, it must be repaired before the new coil is wound. This type of coil will have to be wound with the stampings in position and will require a jig to hold and rotate the pole.

Fig. 40(*a*) and (*b*) shows two other types of windings: (*a*) the distributed, and (*b*) the compensated. In (*a*) a single salient pole is replaced by a group of coils (4-6) connected in series and giving a resultant pole. In (*b*) we have two very similar distributed units displaced 180 mechanical degrees, and each group must be insulated from each other, in spite of the fact that they are connected in series.

An engineer, as distinct from a winder, should not attempt to rewind either of these two types as the technique is most complex.

On the other hand, testing can, to a certain extent, follow the methods mentioned above, treating each coil group as a unit. Each similar group should obviously give similar readings. If the compensated field assembly is removed for cleaning, the position of the stampings in relation to the brush gear must be marked.

# E.D.A. presents Mechanical Handling

CONFERENCES on higher productivity have always stressed the importance of mechanical handling techniques in any stepping up of factory output. In its latest film, the Electrical Development Association has taken up this theme and cleverly developed it.

Entitled "A Case for Handling," the film concerned runs for 32 minutes, and has been designed for showing to works staff of all grades. It has a dual purpose: the showing to workpeople generally of the ways in which the latest materials handling methods can improve their jobs, and the forcible presentation to management of its production advantages.

The film presents its story in dialogue style, and though it concentrates its attention on the problems of a small die-casting firm, it draws examples from a number of other industries.

*Lansing-Bagnall pallet trucks are seen in this still from the film*

Another new E.D.A. film which we have been privileged to see recently is a more modest production entitled "Distribution of Electricity." This 11-minute reel shows the stages in which electricity is brought from the power station to the ultimate user. It is intended primarily for technical audiences in the electricity industry or in technical colleges, but it is simple enough in its technicalities to hold the interest of general audiences. One particularly attractive feature of this film is its careful emphasis on economy as a reason for many of the techniques used in distribution.

# Electrical Accidents in 1950

## *THE LESSONS THEY PRESENT ARE REVIEWED AS A GUIDE TO FUTURE SAFE WORKING*

WITH more pages than ever before, though it is unfortunately marked at a higher price, the edition of "Electrical Accidents and Their Causes" for 1950 contains a very broad review of the whole range of industrial electrical safety. It is impossible in these columns to cover adequately the many lessons to be learned from the incidents it describes, and so this summary will have to be restricted to the more important suggestions that are made in it.

In general, a fairly optimistic view seems to be taken of the state of electrical safety in the year concerned. During this period there were 128 fatal electrical accidents, of which 54 were domestic. "Reportable accidents" totalled 778. A full analysis of this latter total was given in the ELECTRICAL TIMES of February 28, 1952, page 394. Causes to which the senior Electrical Inspector now draws particular attention include careless methods of working by electricians, poor earthing, and breakdowns in the chain of responsibility.

### *Electricity Supply*

Under the heading of electricity supply, the topic of breaking capacity of switchgear and of system fault potential is once again raised. It is noted that while information about prospective fault currents was always available from supply authorities, sometimes it was "on tap," whilst on other occasions it took a considerable time to find. In certain cases charts of the whole area concerned were being kept to record this information, and arrangements existed for keeping them up to date. In some areas there seemed to be the possibility of supply authorities accepting the principle of setting a limit to fault potential at consumers' terminals, and announcing this, so that industrialists knew the rating of switchgear that they would have to install.

Amongst detailed matters discussed there is again a whole series of accidents involving some breakdown of a permit to work system. As is usual, the protection of bus-bar spouts is commonly involved in this type of trouble. It is apparent that the authorising engineer must check most carefully that the shutters over live contacts are securely locked.

The quality of electrical installations in new factories inspected during the year was in general quite high. Of existing installations, however, the report says "the effects of wear and tear are often more marked than efforts to combat them." It is thought probable that despite such observations, the relative steadiness year by year of the number of electrical accidents, in spite of the greatly increased use of electricity, is in some measure due to the progressive recognition that has been accorded to works electrical engineers, and to their increased authority.

One fatal accident during the year drew attention to the very careful watch on safety matters which is advisable in the period between the completion of a factory and its going into operation. The establishment concerned was a large steel rolling mill, and the machine concerned a 6,600 h.p. motor. Workmen adjusting this were involved in an accident when it was unexpectedly excited. Switchboards on this site were at this stage unprotected, although they had been railed off at an earlier stage of construction, and despite a large crowd of non-electrical personnel being in the vicinity, no steps were taken to ensure that the motor was clear before it was started.

In electrolytic plant, the more extensive use of mercury arc rectifiers, and thus high voltages, is bringing some difficulties about safety in usually well earthed surroundings. The solution with new plants seems to be to aim at an earth-free construction. Bituminous or rubber solutions may be used for the floor, insulating materials around feed pipes, and also as a lining for them, and liquid breaks in the flows to prevent any earthed metal being exposed. Such precautions are necessarily expensive, and they may offset the advantages to be gained by the more efficient conversion at higher voltages.

### *Portable Tools*

Low voltage operation has for some years now been recommended as the only satisfactory answer to the safety problem presented by portable tools. The report records that considerable progress has been made in the adoption of such machines by large organisations.

It had been found that the feared unhandiness of tools as a result of the use of lower voltage motors to drive them had not materialised. Instead there had been an increase in sturdiness, with consequent reduction of upkeep in rough conditions of use.

The use of low voltage tools is extending to the field of building construction only slowly, but a large number of large contractors are reported to have extended their use of such machines. For such concerns, there was a notable improvement in the standard of temporary installation about building sites, largely achieved by the extensive use of t.r.s. cable, further protected where necessary by rubber hosing. The standard of temporary installation on small sites remained poor.

With regard to the use of electrical equipment in inflammable surroundings, an increasing number of situations were found in which flameproofing was not a possible solution. In these cases the alternatives of pressurisation or intrinsically safe circuits working with remote relays were adopted. In one case pressurised portable handlamps were considered, the supply coming through a divided neoprene hose. One section of this carried the electrical connections, and the other acted as a duct for the air supply.

### *Earthing*

The report notes the change of outlook that has occurred over the past twenty years in regard to earthing problems. It notes that reports from inspectors now concentrate on loop testing, and that there is a growing awareness not only of the shock danger but also of the fire risk involved. The increasing age of wiring was making it more than ever necessary to be reasonably sure that when failures occurred they were quickly disconnected.

Many Area Boards were found to be spending money on work to reduce the earthing resistance at their substations to a value that would permit consumers' protective apparatus to function. In some cases this was proving a very costly proceeding, and it seemed that attention would have to be given to the possibility of current-balance protection for consumers' premises.

An idea of the expense involved is given by a report which lists resistances at transformers of the order 30-50 ohms, and notes the cost of reducing them to values at which the feeder fuses can operate. These range from £10 to £30 for each transformer.

So far as consumers' premises are concerned, the necessity is stressed of abandoning the idea of the "earth plate" and concentrating rather on rods driven deeply into the ground. By using a suitable number of rods driven to a sufficient depth and spaced 10 to 20 ft apart, much lower values of electrode resistance to earth can be obtained for a given expenditure than are possible with an earth plate.

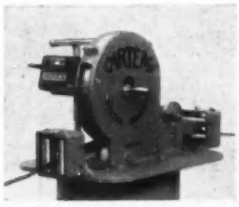
High-frequency heating continues to find increasing application in industry, but so far it seems to have caused few accidents. Those quoted in the report involved either the lack of guards for electrodes, which caused burns to operators, or the defeat of interlocks or other protective devices.

Welding accidents during the year show that although there is normally little serious risk at the voltages in common use, accidents can arise when welding at 80 volts is undertaken in confined spaces. Most of those described in the report were in connection with work in or about ships, and the position was made more serious by the difficulty in extracting the welder from his working place.

As an appendix to the report, there is published a description of high-frequency metallurgical furnaces. The report is obtainable from H.M.S.O., as Form 929, price 3s.

## Measuring Cable Lengths

ACCURACY in the measurement of cable lengths has been the aim of Messrs. B. & F. Carter & Co., Ltd., in producing their "Exactor" measuring machine for cables up to ½ in. in size. The machine, of which the head can be seen in our illustration, relies for its accuracy on a measuring wheel, one yard in circumference. Mounted on ball-bearings, the wheel has bonded to its periphery a layer of sponge rubber, over which is stretched a tyre of thin tempered steel. Pressing the wheel on to the cable passing through the machine, minimises slip, and it is stated that an accuracy of 3 in. in 100 yd has been thus obtained. Jockey wheels and rollers are provided to straighten the cable before it meets the measuring wheel. Although the machine is designed for fixing to the floor, the steel pedestal is of sufficient weight to provide stability for portable use.



*Head of "Exactor" measuring machine, showing prominence of indicator*

*Notes on Wiring* by MEGOHM

# INTERLOCKS

## *Their Usefulness in Domestic Installations is Examined*

THE advantage gained by incorporating mechanical interlocks on switch sockets of ratings up to 15 amp for single-phase circuits, some say, is debatable. In support of good interlocks on switch sockets, it can be said that the plug cannot be withdrawn from the socket with the switch in the "on" position and the switch cannot be switched to the "on" position if the plug is not in position, thereby making it impossible for a person to make contact with the live tube in the socket. Further, on d.c. circuits the interlock prevents the plug being withdrawn from the socket on load, which may give rise to arcing and possible burns.

The case against interlocks is the increased risk of damage to the switch sockets and flexible cords by persons trying to pull out the plugs when the switches are in the "on" position. Further, with certain types of interlocks, it is possible for the switch to be placed in the "on" position with the plug withdrawn from the socket. In this condition the live-socket tube is exposed and damage can be done to the switch mechanism by trying to force the plug into the socket with switch in the "on" position.

Since the introduction of the shuttered socket, the main advantage claimed for interlocks, preventing contact, accidental or otherwise, with live socket tubes, is more or less met with a well-designed shuttered socket which automatically shields all socket tubes on the withdrawal of the plug.

Flat and house control units have for some time been fitted with 30 amp or 60 amp microgap switches which are not provided with interlocks. These switches in some cases are housed in a separate compartment adjacent to the final sub-circuit fuses and all live terminals are effectively shrouded, the complete assembly providing a neat and satisfactory unit.

The design of standard ironclad splitter units which are fitted with interlocks could with advantage follow similar lines, since as most of us know there is great inconvenience in having to switch off a whole installation to repair a single final sub-circuit fuse. For splitter switch units up to 60 amp rating, the interlock could safely be omitted if an effective shroud were fitted over the live terminals. This would be preferable to the present arrangement where it is possible for the householder to make accidental contact with exposed live terminals when the splitter switch case is opened.

### *Main Switches*

Interlocks on main switches, fuse switches and switch fuses for use on circuits up to 660 V are dealt with in B.S. 861:1939, where it is stated that if the cover of the case can be opened without the use of tools an interlock should be provided to ensure that in normal operation the case cover cannot be opened with the switch in the "on" position, or that the switch action cannot be closed when the cover of the switch is open. The interlock, however, should be so arranged to enable a competent or authorised person to make and break the switch with the cover open so that the operation of the mechanism can be examined to ensure it is in good order. Alternatively for switches other than mining types, interlocks need not be fitted provided the covers cannot be opened without the use of tools.

In general, there are two methods used for the interlock of the covers and cases of switchgear. On ironclad switches, fuse switches and switch fuses the interlock is effected by a simple boss on the case cover engaging with the switch operating handle when in the "on" position preventing the cover being opened until the operating handle is pulled down to the "off" position. With this method of interlock there are no moving parts other than the switch handle and the arrangement is simple and positive. On cubicle type switchgear where the switch covers are of the flush type and protruding bosses are not permissible, interlocking is carried out by a system of levers and springs which in time may give trouble due to misuse and wear and tear. Cubicle type switchboards are generally operated by competent people so under these conditions there appears to be little advantage gained by the fitment of interlocks, excluding, of course, special requirements such as interlocks for preventing paralleling of incoming and outgoing circuits.

# *Continuous Measurement of* CABLE DIAMETERS

## AN ELECTRONIC GAUGE FOR USE IN FACTORY PRODUCTION

by E. C. R. SCARFE*, B.Sc., (Eng.), A.C.G.I., A.M.I.E.E.

THE covering of wires with insulating materials, such as polythene, p.v.c., and rubber, by an extrusion process is common practice in the cable industry. In principle the insulant is heated in an extruder and forced out by a rotating screw through a die of predetermined design and shape depending on the materials and type of cable required. The conductor is also passed through a point in the head of the extruder and is covered at the point of exit with the insulant. The covered wire is then passed through a water bath for cooling before it finally passes round the haul-off and take-up drums. Owing to the nature of the materials and because they are under pressure in the extruder, they expand on emerging from the die, and the final diameter of the covered wire has to be controlled by the relative speeds at which the conductor is pulled through the head and the insulant is forced out of the machine. These speeds are adjusted so that the insulant is pulled down to the correct size and if other things remain constant, then when either the haul-off or the screw speeds change, the diameter of the final cable will alter.

The final overall diameter is very important, especially when the radial thickness of insulation may be only a few thousandths of an inch, and where such cores are to be made into multi-cored cables. Also the electrical requirements of some cables are often so stringent that diameter variation must be kept very small.

In the past, diameters were periodically checked by an operator using a micrometer or a 'go' and 'no go' gauge and, from the readings obtained, the speed of the haul-off was adjusted as required. Such a procedure is not very practical over long periods of production and is impossible at the very high speeds of extrusion that are used today, for the cable could be easily damaged by such a gauge. Extrusion speeds up to 30,000 yards/hour or higher are fairly common for the smaller sizes of covered wires.

### *Continuous Indication*

At such high extrusion speeds, scrap cable can be considerable, unless extreme care is taken throughout the process. In view of this it became essential to develop a continuously indicating instrument of high accuracy. Such an instrument must be independent of the extrusion speed, and of the extruded material and must not damage even the softest insulant. Other requirements are that the apparatus must be capable of being easily adjusted to cover the range of cable sizes extruded by a particular machine and still maintain its accuracy. Also maintenance must be kept to a minimum.

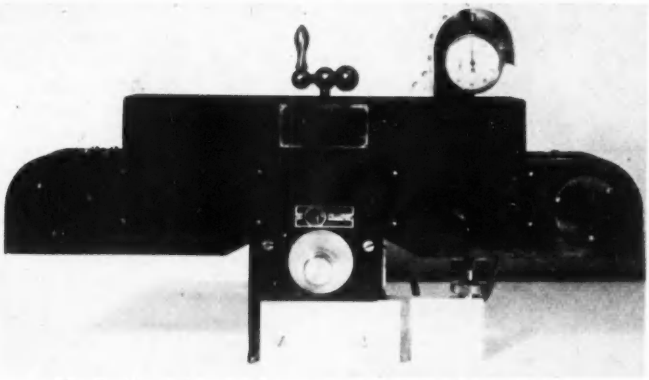


*Fig. 1. General view of measuring instrument set up for use*

Obviously, a very special type of instrument was required to meet these requirements and to withstand continual use under factory conditions. After careful consideration of the possible ways of making the measurements, it

* *Henley Research Laboratories.*

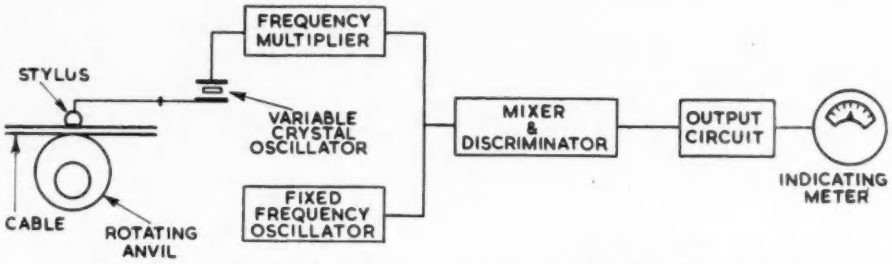



*Fig. 2. This line diagram illustrates the circuit principle which is used in the gauge*

was considered that a conversion of changes in physical dimensions to electrical variations would probably give the best solution. From this an electronic diameter measuring gauge for continuous cable measurements was developed in the Henley Research Laboratories and this has proved successful and reliable over a number of years of factory use.

The fundamental principle of the gauge was based on a development of the N.P.L. and covered by U.K. Patent No. 594,308. The manufacture for general use is being handled by Sargrove Electronics Ltd.

The apparatus consists of two main elements, namely, a measuring head and an electronic unit and indicating instrument.

The final design of the measuring head suitable for factory use is shown in Figure 4. It is a self-contained unit and is mounted in the production line between the end of the cooling bath and the haul-off capstan. Since a considerable amount of water is thrown up from the water bath, the head is sealed and of such a shape as to keep water from the moving parts. It houses a guide system for the cable and also a unit for converting any change in diameter from a predetermined value to a variation in an electrical circuit. The required nominal diameter setting is obtained by a vertical micrometer slide, the control handle of which is shown projecting at the top of the head, and the value is indicated directly on a dial gauge. By these means the instrument indicates diameter variations irrespective of the nominal cable diameter setting. The maximum size of cable that can be measured is limited only by the range of the vertical slide and the dial gauge.

## *Measurement*

The actual measurement takes place between a light tungsten-carbide tipped stylus which rides on the cable and a precision rotating anvil located beneath it. Facilities are also incorporated for removing the anvil from its measuring position whilst setting up the extruding machine so as to avoid damage during the starting period. These details are shown in Figure 4 where the stylus head is seen projecting through the main casing to rest on

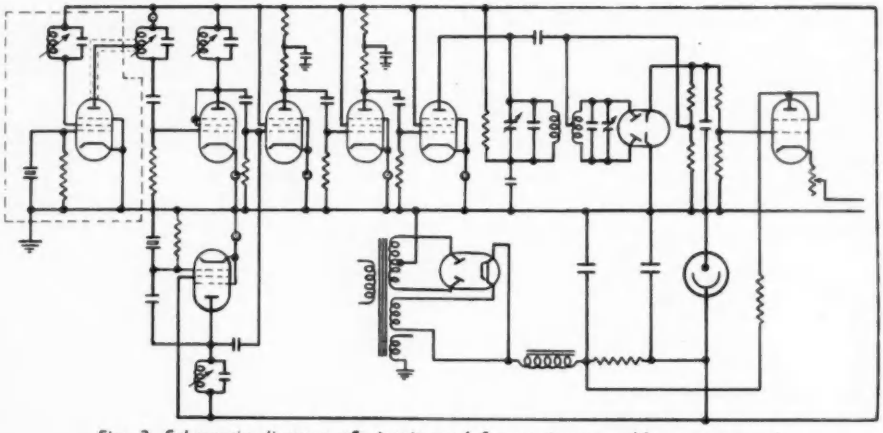


*Fig. 3. Schematic diagram of circuit used for continuous cable measurement*

the cable which in turn is supported by the anvil. In the non-measuring position the anvil is rotated anti-clockwise away from the stop seen on the left hand side. The anvil, of necessity, is rather complicated, as it has two centres of rotation and must return to the same precise position for measurement, and the accuracy of the moving parts must be extremely high, as any variation will be indicated as diameter changes. The physical measurements converted into electrical signals in the measuring head are passed on to a separate unit and there converted into suitable voltage changes for display on a large meter. The meter can be mounted at any distance from the place of measurement in a position suitable for an operator to have a clear indication of the diameter readings.

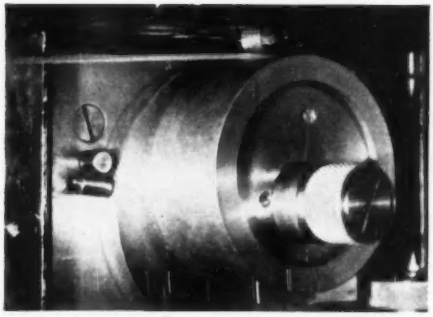


*Fig. 4. The cable runs between the stylus seen at the top of the illustration and the rotating anvil which almost fills the rest of the picture*

The measuring system is such that the movements of a pivoted stylus cause variations in an air gap between a fixed quartz crystal and one of its electrodes, the stylus being attached to one end of the metal rod and the electrode at the other. The relative movements of the stylus to the electrode is kept large so that diameter variations only cause small changes in the air gap. These changes alter the capacity in series with the crystal and thereby shift its resonant frequency, the limit of frequency change being in the order of 2 kc/s in 1·6 Mc/s. By limiting the air gap variation the frequency change can be made approximately proportional to the movement of the stylus.

By referring to the circuit diagram, in conjunction with the diagram showing the principle of the gauge, the details of the apparatus can be clearly followed. The variable crystal is frequency multiplied in two stages and mixed with another fixed crystal-controlled frequency to produce a frequency-modulated carrier. In the present design this carrier is 100 kc/s. These signals are then fed to a conventional discriminator and output circuits to give a d.c. voltage output which is made to show both plus and minus deviations from a preset nominal diameter. The indicating instrument is calibrated in thousandths of an inch and shows readings of ±0·003 on an 8 in. scale. Thus a thousandth of an inch change in diameter of a cable is indicated by a movement of over an inch on an indicating meter which can be seen easily by the extruder operator.

As an example a curve is included which shows the diameter readings of a cable having an 0·044 in. conductor and a nominal radial thickness of insulation of 0·012 in. produced in conjunction with the gauge. Whilst producing this cable the extrusion speed was varied between 9,590 yards per hour and 20,050 yards per hour and the maximum diameter variation was found to be only 0·002 in.

The use of the electronic device in conjunction with other modern cable-making equipment enables cables to be produced at increased speeds and with very consistent dimensions. This has the advantage of higher outputs per unit of plant, and in some cases, improved attenuation characteristics of the cable.

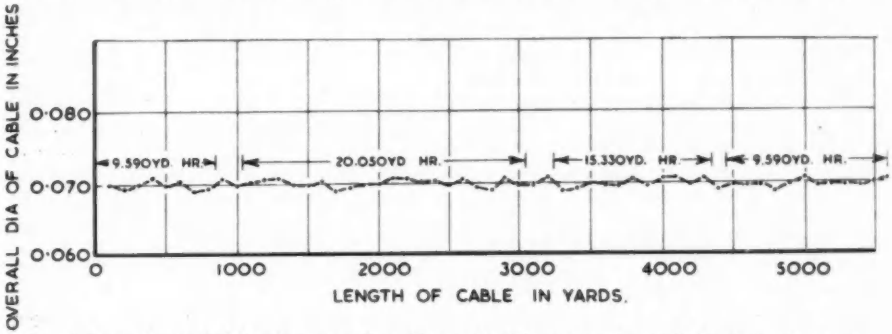



*Fig. 5. Typical record of the diameter of a cable produced in conjunction with the electronic gauge*

# Electricity and *RE-ARMAMENT*

## *Parliamentary Committee Investigates Defence Projects*

ELECTRICITY is being used on a large scale in some of the important defence projects now being undertaken by this country while the projects themselves, in turn, are producing knowledge with a peaceful application which may at a later date assume importance in generation techniques. Some interesting information on this activity is contained in the tenth report for the present session of the Select Committee on Estimates, which has recently been published.

Not unnaturally, some of the most interesting facts revealed relate to nuclear energy. Although the committee's main concern is with public expenditure, its investigations necessarily go into some detail as regard present plans and future intentions. It was estimated by witnesses before the committee that some 80 to 90% of the atomic energy research and development effort, particularly as regards reactors, is common to both civil and military purposes. Costs (which have been kept secret) include what a witness described as "a very large item which will probably astonish you" for electricity consumed for the blowers in the big piles at the production establishment near Windscale (in Cumberland) which produces fissile material from pure uranium. This in turn is obtained from imported concentrates processed at Springfields (near Preston).

A third production establishment is at Capenhurst, but its purpose has not been disclosed. With this factory and that at Windscale, it was hoped to start at about the present time a project for the use of fissile material to produce power, and in doing so, produce still more fissile material. It was hoped to have the first experimental unit operating in 1956-57.

As an example of the way in which costs run high because development is of necessity "going ahead faster than ordinary commercial prudence would direct," the case of Windscale was quoted. There, after the chimneys of the plant had been built, it was discovered essential that the gaseous effluent should be filtered. In the result the choice lay between placing filters at the top of the chimneys or knocking the chimneys down and rebuilding them. Actually, they were placed at the top.

In regard to work at Harwell, Sir John Cockroft estimated that one-third of it could be broadly described as research, and the remainder as development. About 40% of the Harwell effort was devoted to problems of the production establishments, and 60% to civil applications of atomic energy.

There were periodical conferences with representatives of industry on atomic power, on average about once a year. Representatives "from big companies such as C. A. Parsons, Metropolitan-Vickers, English Electric and so on" were made aware of what the Harwell programme was. At the present time they indicated that they were so busy with rearmament that they would rather wait before getting into the atomic energy business.

### *Wind Tunnels*

During a visit to the National Aircraft Research Establishment at Bedford, the Committee heard some facts about the new wind tunnel under construction there. This is to be powered directly from the Grid, but a gas-turbine power station is being built in order to assist the Grid. This will have the advantage of very rapid stopping and starting; a 5 to 10 minute loading period is expected. The station was not likely to be cheaper in terms of cost of energy than the Grid, but it had many advantages in the way of flexibility.

In their main report, the Committee notes that it was not entirely satisfied with the present method of call-up of engineering apprentices. It recommends that apprentices should never be called up until their apprenticeship is completed, and that consideration should be given to the creation of some form of technical Reserve in which skilled men who have served their apprenticeships should carry out their military service.

They further note in relation to scientists and technologists in the Government service that responsible and highly trained men employed in posts requiring exceptional ability are seriously underpaid in relation to their duties. In this respect, evidence was presented to the committee that scientists reached the £800 mark at 29 and £1,000 at 34, and subject to satisfactory service, proceeded eventually to about £1,400 (outside London).

# Problems and Practice
## IN ENGINEERING

### *Points on C.T. Design*

THE current density adopted in current transformer design work varies over fairly wide limits, but in some cases a figure of 120,000 amperes per sq in. is employed, and so far as can be ascertained, is quite satisfactory. Consider the case of a 100/5 current transformer supplying the trip coil of a circuit-breaker employing this figure as the maximum permissible current density. The primary consists of 31/16 s.w.g., which is equivalent to a cross-sectional area of 0·1 sq in., the rupturing capacity of the circuit-breaker is 10,000 kVA and the working voltage 2,000 V, 2 phase. From these figures the value of current at short-circuit may then be calculated as follows:

$$\text{Short-circuit current} = \frac{\text{s-c. kVA} \times 1{,}000}{2 \times \text{E}}$$

$$= \frac{10{,}000 \times 1{,}000}{2 \times 2{,}000}$$

$$= 2{,}500 \text{ amperes.}$$

The necessary cross-section of conductor in order to comply with a current density of 120,000 amperes per sq in. would be equal to 2,500/120,000 or 0·02 sq in.

Now the actual cross-section is 31/16 s.w.g. or 0.1 sq in., from which, using the above figure of 120,000 amps/sq in. for current density, the maximum current permitted is given by $120{,}000 \times 0.1 = 12{,}000$ amps.

The corresponding short-circuit kVA

$$= \frac{2 \times 2{,}000 \times 12{,}000}{1{,}000}$$

$$= 48{,}000$$

Therefore the 100/5 current transformer for 10,000 kVA service will have a factor of safety of 4·8 (i.e. 48,000/10,000).

The temperature rise per second can be approximately estimated, using the figure for current density from the following equation: $^\circ$C rise per second $= (\text{I/A})^2 \times 1{\cdot}2 \times 10^{-8}$, where I/A is the allowable current density. Substituting the value of 120,000 amperes per sq in., the $^\circ$C rise per second

$$= 120{,}000^2 \times 1{\cdot}2 \times 10^{-8}$$

$$= 173$$

The actual temperature rise would be higher than this figure, as this does not take into account the effect of resistance.—*M.I.C.E.*

### *Starting Clocks*

I SUPPOSE many of my fellow readers of this column have at some time or other encountered a synchronous clock that was difficult to start. In my experience the fault is sporadic, i.e., it is possible that out of six attempts to start, six are successful. Of course, it is equally possible to be the other way about and for six attempts to be unsuccessful, but if the former result is obtained who would blame anyone for assuming the mechanism to be in working order. Before offering an explanation as to the reason for these erratic results, it is necessary to give the source of the trouble, viz.: too great a cohesion between rotor and flywheel.

First of all, for the sake of comparison, let us examine the conditions for starting in a clock that is working correctly. A lever or knob is flicked manually, and this in turn accelerates the rotor flywheel unit from rest to a speed in excess of synchronous revs., from which the speed declines until synchronous speed is reached. At this instant the spring coupling between rotor and flywheel allows the rotor to spread, over a minute period of time, the job of converting the declining speed characteristic of the flywheel to one of constant speed.

Now to consider the clock which is a bad starter. In this instance, the rotor and flywheel have no flexibility in relation to each other and are in effect a solid unit. So in a description of the sequence of starting events, the previous paragraph holds, except that when the rotor attempts to flatten off on to synchronous speed it must develop energy to manipulate the flywheel as well, with no attenuating factor as is provided by a resilient coupling. If the angle of speed decline is sufficiently steep the clock will fail to start, but if luck is with the operator and the initial speed imparted by him is at, or slightly above, synchronous speed, the clock will start.—*G. W. Eaton.*

*Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at our standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.*

# RADIO SHOW REPORT

## *Lively and Interesting Exhibition draws Exceptional Support*

LAST week we gave a brief account of some of the principal features to be seen at this year's Radio Show at Earls Court. Now that the Exhibition has been open for some days a more detailed appraisement is possible.

The first thing which strikes the visitor is the emphasis on selling shown by the great majority of exhibitors; the second is the improvement in stand design and the ingenuity shown in making the display attractive.

As far as the sets themselves are concerned there is, as Lord Burghley pointed out in his opening speech, no epoch-making improvements, as development has, during the past year, been concentrated on detail points, styling and reliability.

Television, as is to be expected, shows a tendency to swamp the sound radio side, although some of the most elegant items to be seen are the large radiograms.

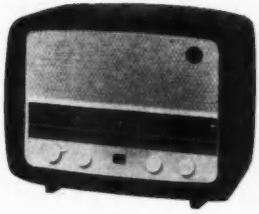
### *Television Sets*

Generally, the trend towards larger viewing screens continues. Last year the emphasis was placed on the 12 in. tube, with the 9 in. model in the background; this year, most sets lie in the 14 in. to 21 in. range, the 12 in. unit being comparatively rare. Among the larger units is the Orion 17 in. aluminised tube 18-valve console model by Ace Radio priced at 115 guineas. Baird Television have a 15 in. table model at 89 guineas, Alba (A. J. Balcombe) also have a table model, the T392, at 89 guineas.

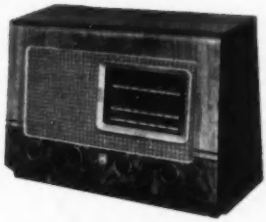
For 89 guineas, one can purchase from

*Above, left, is the Philips 14 in. model 1427u/f and on the right Ferranti's radiogram model 425. Below, left, is one of the testing machines on T.C.C.'s stand*

*G.E.C. have this portable a.c./d.c. battery receiver*



*The Stella type ST 151A shows elegant styling*



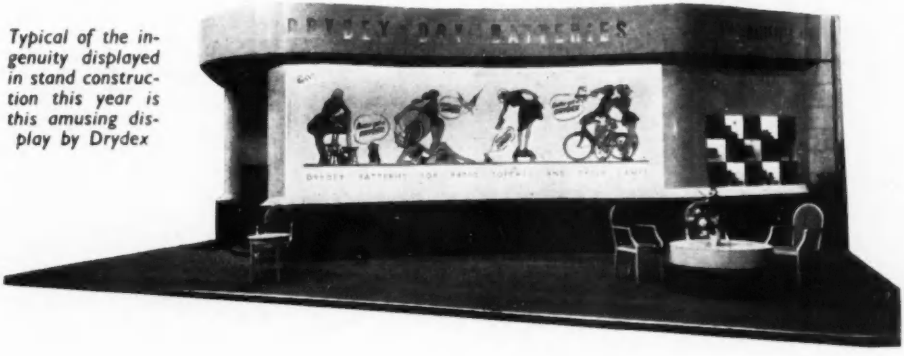
*Ekco Model A144 all-wave superhet*

E. K. Cole the T.164 Model which has a 15 in. aluminised tube and also incorporates "spot-wobble." English Electric are showing for the first time their Model 16C14, employing a 16 in. metal tube and listed at £85 18s. 3d. with tax £39 1s. 9d. extra. From Ferguson (Thorn Electrical Industries) comes a new 14 in. table model, the 99IT which features Ferroxdure focusing and an electronic stabiliser. The set is a full range 22-valve model and costs 71 guineas. It is specially adapted for fringe area working and will be available in mid-October.

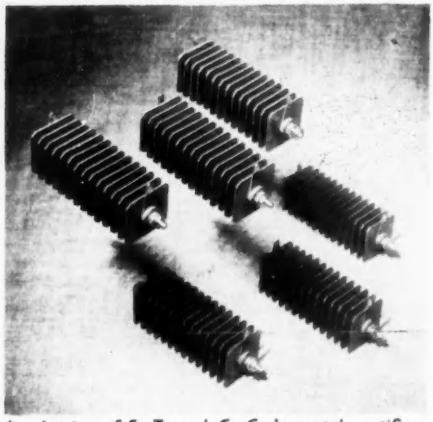
Ferranti's have produced a new projection set to give a picture 15 in. by 11¼ in. This costs 149 guineas. For the small room—and the lighter purse—is G.E.C's. workmanlike a.c./d.c. 12 in. table model retailing at 69 guineas. Larger sets, being shown by the same firm embody 16 in. tubes and retail at 95 guineas for the table model and 128 guineas for the console version.

Largest direct-viewing set in the Show is the H.M.V. 1820, which uses a 21 in. tube to give a picture measuring approximately 18 in. by 14 in. while among the models being shown by Kolster Brandes is the HF 60 with a 17 in. rectangular tube costing 120 guineas. McMichael Radio, who have concentrated largely on reliability with low cost have mainly current models at reduced price on view, but are also due to produce the model TM 52 12 in. table unit at 67 guineas (which can be seen on the stand) in mid-September.

Several models, ranging in price from £72 10s. up to £135 can be seen at the Murphy Radio Stand, while both projection and direct-viewing units are being shown by Peto Scott. Philips have a new TV receiver, the 1238U table model suitable for all areas, and special fringe-area versions of the 14 in. 114U and 1427U sets are available. In the projection field is the 1400A giving a 16 in. by 12 in. picture and the 6027A/60287 projection outfit which gives a 4 ft by 3 ft picture on a separate screen. Pye are introducing the 14 in. black screen console FV4C giving an almost flat 11⅛ by 8¼ in. picture and also the FV2C 16 in. black screen console, and Ultra, among their extensive range have the YA72 12 in. console with radio at 92 guineas and the Y84 15 in. console with radio at 115 guineas. The cheapest television set in the Show is the C.W.S. "Defiant" retailing at £45 including tax. For industrial and educational use is Valradio's range of wall projection T.V. sets.



*Typical of the ingenuity displayed in stand construction this year is this amusing display by Drydex*



*A selection of S. T. and C. Co.'s metal rectifiers*

### *Receivers and Radiograms*

In the radio and sound-reproduction fields, the keynote this year is quality, although the transportable and portable sets are prominently displayed. Alba, for example, have a radiogram for universal use, which operates on d.c., a.c. or batteries, and retails at 30 guineas. New this year is the Champion Electric Corporation's "Coronation" 3-speed radiogram which incorporates full tone control and flywheel tuning. Cossor, who are, incidentally, among the few exhibitors showing table TV-radios, are celebrating the silver jubilee of the "Melody Maker" with the modern version 501 costing £19 2s. 11d.

Decca cater for the "de luxe" purchaser with the Knightsbridge TV-radiogram combining a 16 in. by 12 in. picture with a three band radio and a 3 speed autochanger at £350. Dynatron's well-known Ether Conqueror series have been further developed in the continuing search for perfection. Ecko feature the ARG 168, a three-speed auto-change radiogram, and also have two car radios, the CR 117 and CR61. The latter is truly an elaborate receiver being of the all-wave type with bandspread 19, 25 and 31 metre ranges and capable of feeding four speakers. The cheapest radio set in the Show can be seen on the Every-Ready stand. This type "H" two-valve set is priced at £7 13s. 1d. Ferguson have several receivers and the 500 auto-radiogram (described in our last issue). Portable and transportable sets are prominently featured by Ferranti, and in the larger sizes are the 415 and 415LP three-band auto radiograms, and the 425 and 425LP auto radiograms, priced at £74 10s., £79 10s., 80 guineas, and 85 guineas respectively.

A newcomer on G.E.C's. stand is the BC5839 with a novel method of pre-setting three selected stations (33 guineas) and a new three-speed radiogram at 72 guineas. H.M.V. has a wide range of radiograms and receivers, and Kolster Brandes are showing the FG25 a.c./d.c. auto radiogram at 80 guineas and the FG 50 de luxe model, which has eight bands, multi-speed turn table and storage for 200 records at 126 guineas.

*Exide polystyrene container unspillable portable battery*

From the Marconiphone Co. comes the Model T29A, a five-valve all-wave unit incorporating three pre-set station selection. Philips have the "New Symphony" radiogram at 75 guineas.

For the connoisseur is the ARG5000 of R.G.D. which gives world-wide reception with a 6-watt push-pull output.

*Two more stands, G.E.C.'s and Telcon's, show interesting design and layout*

*Ekcovision Model T164 has spot-wobble and a 15-inch aluminised tube*

### *Miscellaneous Exhibits*

Visitors should not miss the demonstration of G.E.C. three-dimensional sound, where separate microphones or sound tracks are used with independent loudspeakers to give an apparent sound source location in space. The Admiralty too give a demonstration of remote-controlled gun laying, using an electronic gun director, which indicates the powerful aid that electronics can give to defence.

The battery makers are well represented, Chloride Batteries, Ltd., showing examples of high tension and grid bias batteries covering every known type of battery operated standard or portable radio receiver. Unspillable accumulators are prominently featured and in this connection the use of polystyrene should be noted. Ever-Ready show *inter alia* batteries for hearing aids. A general idea of the products of battery makers can, however, best be gained from a visit to the stand of the Association of Radio Battery manufacturers, where, in addition to the two firms mentioned, the products of G.E.C., Oldham, Pertrix and Siemens are also shown.

Components are often overlooked, but it is well worth while visiting the Bulgin stand, if only to see the astonishing range of items produced by this well-known firm. Belling and Lee are specialising in aerials and anti-interference devices, but they also are responsible for an enormous selection of smaller items. A. H. Hunt are showing many recent developments in the capacitor field, while Telegraph Construction and Maintenance have on view low loss cables and accessories, particularly co-axial cables.

The automatic testing of condensers is being demonstrated at T.C.C.'s stand where five highly specialised machines, built and designed at the company's Acton factory can be seen performing production line check testing and final testing. Dubilier have a comprehensive display of all types of capacitors.

Westinghouse Brake and Signal are showing many types of metal rectifier while Standard Telephones and Cables, in addition to Bremistors, metal rectifiers and germanium diodes are showing several valves additional to the Brimar miniature range.

Numerous aerials and aerial arrays can be examined at the Aerialite stand, and special anti-interference aerials are available from Antiference, Ltd.

Test instruments are featured by the Automatic Coil Winder and Electrical Equipment Co., A. C. Cossor, Marconi Instruments, Ltd., and Taylor Electrical Instruments, Ltd.

A further interesting item is the combined display being given by Multicore Solders Ltd. and Pye, illustrating the assembly of television cameras. The equipment actually being built at the Show will be exported to America after test.

Finally, and possibly most interesting of all, there is the R.I.C. control room with its television camera, monitoring and transmission equipment for powering the demonstration sets in Television Avenue, and, of course, the B.B.C. studio with a seating accommodation of over 1,000.

Present information is that the Show has drawn an attendance well in excess of last year. It well deserves success, and it is to be hoped that the present sales recession in the Industry will not only be halted but reversed by the efforts of the manufacturers to provide the best there is at the lowest possible prices.

## AN AWKWARD LOAD

Our picture below shows the condenser shells, made by Richardsons Westgarth for the 100 MW set Battersea B, moving through London from the docks last Monday evening. The condensers have a cooling surface of 70,000 sq. ft.

# NEW LITERATURE

### *Transmitting Valves*

*by J. P. Heyboer and P. Zijlstra.*

IN the field of thermionic valves, space devoted to the principles, operation and application of transmitting valves has been comparatively small, due almost justifiably to the wider field of use of receiving valves. This publication then assumes major importance, and there is little doubt that "Transmitting Valves" will become a valuable book for students and engineers alike.

It is assumed by the authors that readers will be acquainted in general with the receiving valve, which they use as an introductory basis for comparison with the transmitting type. Briefly outlining the technology and classification, the authors then consider possibilities of the basic valve—the triode—as an r.f. power amplifier. This preliminary ground is covered thoroughly before the uses of tetrode and pentode in the same application are discussed. Methods of modulation are dealt with, attention being paid to various combinations of these basic methods, and this is followed by a discussion of two uses of the transmitting valve—as an oscillator and as a frequency doubler. Concluding chapters of the book are concerned mainly with special effects likely to be encountered in using these valves, a brief discussion of very high frequency operation, appendices and technical data of Philips transmitting valves. Book VII in the Philips Technical Library series published by Cleaver Hume Press, 284 pages, 9 in. by 6 in. Price 35s.

### *The New Electrical Encyclopedia*

*Edited by S. G. Blaxland Stubbs.*

AFTER a considerable lapse of time, this electrical encyclopedia, first published some 18 years ago, has made a welcome reappearance. It should not, however, be thought that the present work is merely a revised edition of its predecessors; it is, in fact, an entirely new and up-to-date publication completely rewritten and enlarged to cover all aspects of modern day practice.

In the preparation of an encyclopedia of this nature, the main problem is not so much as what to include, but what to leave out. It is only too easy to permit the text book type of presentation to become predominant, thus largely removing the practical interest and taking the earnest inquirer for information into fields far beyond that needed. On the other hand, the simple "popular" type of attack would scarcely prove sufficiently advanced to be of any practical use to the engineer. To strike the happy mean is the main problem of the editor and his associates—and in this case it has been most successfully performed.

The list of contributors is indeed formidable, and it is obvious that no trouble has been spared to obtain the best authorities available in their own particular subjects.

To come to the encyclopedia itself, the first thing that strikes the reader is the remarkable wealth of photographic and line illustrations. These, taken in conjunction with the associated text, make it possible to obtain a full insight into the subjects under discussion. Secondly, the presentation and indexing of the items, arranged alphabetically, is such that it is obvious that much careful study has been put into these important aspects. Thus the cross-referencing system enables one to trace all references to a particular subject or item. Further, there is an unusual aspect in that considerable attention is paid to the "humanistic" as well as to the material and scientific aspects of electricity. Thus the law in relation to electricity supply and use is covered at some length, and sections are devoted to staff, wages and conditions; profession and business, and training and education.

It should, however, be noted that there has been a deliberate omission of information on telegraphy and modern telecommunications as being beyond the scope of the work, but on the whole the encyclopedia gives a comprehensive and well balanced survey of electricity in the domestic, industrial and power fields. Published by the Waverley Book Company, Ltd., in four volumes with a pocket handbook, 1,760 pp., 6½ in. by 10 in. Price, complete, £8 cash, or by instalments £8 8s.

## BOOKS RECEIVED

**Electric Instruments, Meters and Electronic Control,** ed. E. Molloy. Published by George Newnes, 196 pages, 9 in. by 6 in. Price 17s. 6d.

**Electric Motors and Control Gear,** ed. E. Molloy. Compact survey of design, principles of operation and applications. Published by George Newnes 180 pages, 9 in. by 6 in. Price 17s. 6d.

**Hiduminium Technical Data Book.** Conveniently bound and presented tables of properties and of treatments. Published by High Duty Alloys, Slough, Bucks, 125 pages, 8 in. by 5½ in. Gratis.

**Light, Photometry and Illuminating Engineering** by W. E. Barrows. American textbook for electrical engineering students. Published by McGraw-Hill, 415 pages, 9 in. by 6 in. Third edition, price 64s.

**Power Factor Correction,** by H. A. Jones. Issued as Fuel Economy Monograph 6 by the Federation of British Industries, 21 Tothill Street, London S.W.1, 25 pages, 9¾ in. by 6 in. Price 3s.

**Technical Book List.** Contains over 5,000 titles, under 39 subject classifications, of English and American books now available in this country. Published by the Publishers Circular, Ltd., 171 High Street, Beckenham, Kent, 80 pages, at 2s. 6d. each, or 1s. 6d. each for 12 or more copies.

**Transformers and Rectifiers,** ed. E. Molloy. Covers construction, installation and testing for power types. Published by George Newnes, 196 pages, 9 in. by 6 in. Price 17s. 6d.

# U.S. IDEAS APPLIED

## *B.E.A. practice reflects suggestions contained in Productivity Report*

THROUGH the reporting of the technical Press of both countries and the activities of the respective professional institutions, electrical engineers in Great Britain and the United States are well informed on one another's activities. Nevertheless, concentrated study of the situation at a given time can accelerate progress in the adoption of the better ideas on each side of the Atlantic, and this has been the effect of the two productivity teams from the supply industry who have exchanged visits. It is just two years since the British team presented its report on electricity supply in the U.S.A., and now the U.K. Section of the Anglo-American Council on Productivity has issued a review of the effect on British supply practice of the team's experiences.

Some 11,000 copies of the report have been distributed, together with 20,000 copies of a popular summary of its conclusions. A conference to discuss the report was held in each B.E.A. area. Thus the report was assured of attention; some of its ideas were discarded, many have been adopted in a modified form. It is with the description of these categories that the present review concerns itself.

### *Generation and Transmission*

In the design field, "unitisation" of boilers and turbines is now accepted practice, with some 97 plants totalling 4,728 MW planned for programmes up to 1956. Reheat is under consideration for three stations. One detailed result of a reference in the original report is stated to be the greatly increased use of pneumatic impact nut wrenches, an example of "the provision of mobile power at the job."

Network analysers, recommended by the team as an essential tool for the system planner, are coming into increasing use. On the cost side, national negotiations are under way to get what is called "more realistic price levels" for certain equipment, circuit-breakers being quoted as an example.

Tests are planned on the use of armour rods at o.h. line suspension points, with the possible elimination of arcing horns a result of their use. A change to the U.S. practice of heavier conductors is not, however, considered desirable. In the case of transformers, ratings are being adjusted upwards, with a 30% excess of peak load over firm capacity.

Maintenance of live lines has been considered, but conditions regarding it vary considerably from those existing in the United States. In particular, wayleave difficulties here make double-circuit construction necessary, whereas in America single circuits are the rule. Moreover, live line maintenance on high voltage circuits can only be carried out when the atmospheric humidity is less than about 70%, and the limited time during which this occurs here makes development of live-line techniques not worth while. Similar considerations apply to the question of painting towers, but in this case the question of some modification of safety rules is being considered by the appropriate committee of the N.J.A.C.

### *Distribution*

In the field of distribution engineering, the whole subject of the standard of continuity of supply has been receiving attention. The Eastern Board, for example, has adopted a policy of considering the requirements of different classes of consumer separately, and relating the cost to the consumer to the degree of continuity necessary. For general planning purposes, several boards are developing the use of more elaborate statistical records by special sections, in order to permit closer control of their activities.

Substation design has of late tended towards the U.S. practice of a large number of small installations, although some boards hold differing opinions. Outdoor substations have received attention, but planning authorities are considered as likely to object to their adoption in towns. In the field of protection, the Eastern Board is giving special attention to the use of surge divertors and the Midlands Board is experimenting with automatic reclosing switches for h.v. distribution lines.

Various matters concerning transformers are being investigated, including the use of a nitrogen atmosphere above the oil to reduce fire risk and permit higher operating temperatures by slowing down oil deterioration. The loading of transformers on a thermal rating basis is also finding extended application, notably in the Midlands and North-Eastern areas.

Another American type of equipment which is being considered is the self-protected, pole-mounted low iron loss transformer, which

combines in one tank assembly the power transformer, l.v.c.b. and associated protective and control devices.

One feature of American practice in the distribution field which attracted special comment was the concentration on preventive maintenance. One area board in this country is now considering the economics of setting up centralised sub-area maintenance gangs for particular articles such as transformers. Mechanical hole-boring and the cold compression jointing of conductors are other matters in which a number of boards are interested. It is stated that the more ready use of aluminium as the conductor material for low-voltage o.h. distribution really depends on the successful adoption of this latter method of jointing.

### *Organisation and Sales*

On the question of load promotion, the original report noted the U.S. practice of "selective development"—or inhibition—of certain types of demand. It is now considered that the basic problem here is a full knowledge of the relative costs attributable to the various classes of consumer supplied, and investigations into this point have begun. So far as industry is concerned, there seems to be a wide variation in views of how much specialist help it is possible to give prospective customers as regards their own installations.

The selection of new employees is less organised and developed in this country than in America. It has now been generally recognised that in Britain supervisors are responsible for proper induction of new employees, and an employee's handbook is being prepared by the N.J.A.C. New entrants to headquarters and some divisional staffs attend induction courses, and some boards are making similar special arrangements to provide a well-balanced introductory programme for recruits to the industry.

# STRAIN GAUGES IN FOIL

EVERY time a wire resistance strain gauge broke down on a particular test, the cost to Saunders-Roe, Ltd., the well-known aircraft manufacturers, was estimated at about £250. In this case the gauge in question was that located at the tip of a helicopter rotor, where centrifugal forces and vibration easily caused the fine wire to fracture at its joint to the soldering tag at take-out leads. It was soon apparent that drastic measures had to be taken to remedy this defect, and at a demonstration last week at the Savoy Hotel, Mr. M. Brennan, deputy chief designer, Saunders-Roe, indicated that the problem had been overcome.

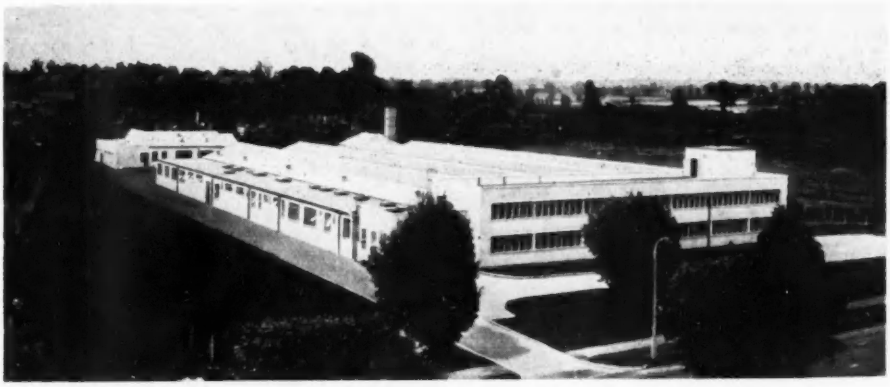
### *Gauge and Tags in One Piece*

Technograph Printed Circuits, Ltd., who were presented with the task of designing, for Saunders-Roe, a gauge combining reliability with sensitivity, have produced the "S.R., T.P.C." foil strain gauge possessing these features and, moreover, remarkably simple to manufacture. Instead of the wire, a length of foil, slightly greater in cross-sectional area, is used, each end of the strip widening out to provide tags to which leads may be easily soldered without fear of fracture. The foil strip, somewhat less than $\frac{1}{64}$ in. wide, increasing in width at each bend as it doubles back on itself to about $\frac{1}{8}$ in. wide, is mounted on a thin lacquer film having excellent mechanical and electrical properties.

To produce the strain gauge a continuous strip of the film undergoes a process in which to one side of it is bonded the metal, usually an alloy of approximately equal proportions of copper and nickel. A roller inks the gauge pattern on the strip, which is then led through an acid bath where the unprotected metal is dissolved.

Estimating that the new gauge would oust the wire gauge entirely in time, Mr. R. Jackson, Saunders-Roe's chief electronic engineer, said that in every way the gauge was satisfactory. Mounting the foil on a lacquer film instead of paper aided the transmission of strain, further assisted by the wide sections at the end of each turn. Due to its high contact area/volume ratio it was possible to increase its operating temperature. This had enabled the gauge to be worked at a current of about ten times that in the wire type, resulting in a corresponding increase in sensitivity. Moreover, the discontinuity problem had disappeared, and with it the wastage of time and labour in replacing gauges during tests.

For Technograph Printed Circuits, Ltd., Mr. T. Vezey-Strong, vice-chairman, explaining the collaboration between the two companies to produce and eventually market the foil strain gauge, said that another important feature of the gauge which should not be ignored, lay in the fact that it was a potential dollar-earning item.



# NEW ELECTRIC IRON FACTORY OPENED

AS a consequence of the remarkable success of the "Atlantic" electric iron specially styled to suit the American market, Morphy-Richards, Ltd., have found it essential to extend their productive capacity by the erection of a new factory at St. Mary Cray, Kent.

The main purpose of this new plant is to enable the firm to achieve not only greater productivity for the export and home markets, but also a lowering of costs by fuller mechanisation of certain processes, which is thought to be unique in the British electrical industry. The present intention is that this latest factory will be turned over entirely to the manufacture of heat-controlled irons, and it is hoped that by the end of this year the output will be increased to 40,000 per week. When this is compared with the output of 250 per week in 1938 it can be seen how far the company has advanced.

The new building, planned on a "Think Before You Build" policy, covers an area of 60,000 sq ft and is the third major expansion since the company's formation. The site chosen has sufficient space for a further extension of similar proportions. It is thought that this is the first large factory to use the "on site" system, which shows great economy.

The "Atlantic" iron itself was exhibited at the Ideal Home Exhibition last March and should be available to the British public in October next. It is designed on entirely new principles, and forecasts a new era of simplified ironing for housewives everywhere. The iron weighs only 2¾ lb—and research has shown that except for the very heaviest work, weight in an electric iron is quite unnecessary.

*Miss Pat Hornsby-Smith opens the factory with Mr. C. F. Richards (extreme left), Mr. G. Wansbrough, Sir Waldron Smithers and D. W. Morphy (extreme right)*

# overseas news

### S. A. Schemes

Six separate schemes for the electrification of the south-east region of South Australia are now being considered by the Electricity Trust. Mr. Playford, the State Premier, has said at present electricity consumption in the south-east is from 8,000 to 10,000 kilowatts, but within 10 to 20 years this would probably rise to 20,000 kW. The Trust would issue a report on the favoured scheme at the end of the month, he said. Of the six schemes, one provides for the establishment of three industrial power stations and an associated transmission scheme, while another proposes a central power station supplying Mount Gambier, Mount Burr, Nangwarry, and Port MacDonnell. The type of fuel to be used was also to be settled, and a possible source was the waste from sawmills, it has been suggested.

### Queensland's Development

More than 73% of the population of Queensland is now supplied with electricity, the expansion in the country areas being phenomenal, according to Mr. F. R. L'Estrange, consumers' engineer to the City Electric Light Co., of Brisbane. At the end of May last the City Electric Light Co. supplied about 70,000 consumers. The greatest rural electrical development had taken place in irrigation and dairying centres, he added. The Mackay City Council and the Dalby Town Council are carrying out rural development schemes under an arrangement with the State Electricity Commission. A line is under construction from Howard to Kingaroy to serve the rural areas in the South Burnett, and a line is nearing completion between Rockhampton and Gladstone which will be carried on to Monto to serve the rural areas.

### Electrification Postponed?

The Railway Commissioners of Victoria, Australia, have recommended that the question of electrifying the Melbourne-Bendigo and Melbourne-Ballarat lines be reconsidered in five years' time, Mr. G. Rogers, chief traffic manager of the railways, stated last month in evidence before the Parliamentary Public Works Committee. The main justification for electrifying any section of railway was high traffic density, but this condition quite clearly did not apply on those lines, he told the Committee. No difficulty was likely in handling prospective traffic on those lines with either steam or diesel-electric power, and there was no necessity from an operating point of view to convert to electric traction, he added. The only other reason which could be advanced for providing electric traction was a saving of black coal, plus a small financial advantage after providing for interest and depreciation on capital charges. But black coal could be saved by using pulverised brown coal, he maintained. He also referred to the future being governed by the availability of loan funds, and added that substantial amounts would be required in the next three or four years for works already in hand, including duplication and electrification of the Gippsland line, which at the moment was almost at a standstill because of lack of funds. In addition there were projects of partial duplication and electrification of the Geelong line, duplication of suburban lines, and provision of new suburban trains.

### Port Augusta Date

The first unit of the Port Augusta power station, South Australia, is expected to be in operation, using Leigh Creek coal, early in 1954. Stating this when discussing the Loan Estimates for 1952-53, the Premier, Mr. Playford, said that at Port Augusta, construction of the tee-head jetty to berth overseas ships which would bring the turbo-alternators, was well advanced. For the construction work the first two 132 kV transmission lines from Osborne to Port Augusta has now been completed, but a start has not yet been made on the second. When the first of the two Port Augusta stations starts up, power will be sent in the reverse direction to the metropolitan area.

### Equalising Costs

A tax on consumers' power bills together with a levy on other generating utilities is being considered by the Manitoba government as the means of equalising charges for the high-cost and low-cost power in the Province, according to reports. The Pine Falls power plant, which has five of its six units already installed, and is operated by the Manitoba Hydro-Electric Board, is the only one whose output comes in the high-cost category. It is being suggested that the Government should place a 10% surcharge on all domestic, industrial and commercial power bills of both urban and rural consumers, supplemented by a $600,000 annual development charge against the Winnipeg Electric Co. and the City Hydro. The development charge, which could be based on the peak load demand of the two utilities' generating station, would cost the company about $390,000 annually and City Hydro about $210,000. The tax on power bills would yield about $1,750,000. The proposal—only tentative, and one of a number under consideration—visualises a decrease in the annual development levy as power from the Pine Falls plant was required, and would drop to nil when

the plant was fully loaded, but the whole annual charge would then be placed on the new McArthur Falls development.

### 345 kV Line

A 345 kV transmission line—the first of its kind in North America—is under construction by the British Columbia Electric Co. at a cost of $4,500,000. The line will run from the company's Wahleach power development, now being built. To traverse the province's rugged territory special twin column towers have been developed by the firm's engineers, and the fabrication of the structures is being carried out by the Western Bridge Co. of Vancouver.

### Alaska Project

In conjunction with plans for the construction of a $400 million aluminium smelting project in Alaska, just announced by the Aluminium Co. of America, a new hydro-electric plant in Canada would have to be provided. The project would initially be capable of producing 200,000 tons of aluminium a year, and it is proposed that the necessary electric power should be obtained by damming the Yukon River at Milles Canyon, near White Horse. From here, the water would be carried 21 miles via two tunnels beneath Chilkoot Pass. Before it can proceed with this scheme the Aluminium Co. of America must purchase the necessary land and obtain Government approval. It will also be necessary to obtain an agreement from the Governments of Canada and British Columbia for diverting the waters of the Yukon River, and make application under the Water Power Act.

### Gold Coast Discussions

Discussions have recently taken place concerning the placing of contracts in Britain in connection with the Volta River hydro-electric project and other Gold Coast development schemes. Mr. K. Botsio, Minister of Education and Social Welfare of the Gold Coast, has stated.

### Railway Electrification

Within the next few months it is hoped to begin electric working over the 97 miles of the South-African Railways' Capetown-Johannesburg main line from Bellville, near Capetown to Touws River, just over 50 miles from Worcester. The locomotives, being supplied by the North British Locomotive Co. and the General Electric Co., for this scheme are in course of delivery, and the first of them has already been running on the Natal system. By next June, it is hoped that new motor coach stock with 3,000 V electrical equipment will have been received, enabling the Capetown-Bellville section to be changed over from its present 1,500 V system. For these new motor coaches the Metropolitan-Vickers Electrical Co. is supplying 52 electrical equipments, while the mechanical parts are being built by the Metropolitan-Cammell Carriage and Wagon Co., and the Birmingham Railway Carriage and Wagon Co.

### Hungary's Scheme

Work has begun on a 55 million kWh power station at Tiszalok, the first stage of the Theiss River hydro-electric system in the Hungarian basin, according to reports from Vienna. The system will eventually include two more power stations at Tiszabo and Szeged, of similar capacity. Eventually the whole system will be linked to the larger hydro-electric system to be constructed on the Danube. In addition to providing light and power for the surrounding country, the Theiss River scheme, which is centred in the driest part of the Hungarian basin, will store water for the irrigation of the area.

### Israel's Problem

The Palestine Electric Corporation has now connected up Beersheba to the country-wide grid system, and power is being obtained from the Reading generating station. The small generators which have supplied Beersheba for the past few years have been moved to Elath.

There is also news that in Jerusalem and that area, there is some protest at the increase in electricity tariffs ranging from 25% for irrigation to 45% to 60% to domestic consumers. It has been stated that the Jerusalem Electric and Public Service Corporation, Ltd., had asked for a 140% increase in tariffs, but the Minister of Commerce and Industry has approved the new rises for a two-month period after which another adjustment may take place. Meanwhile the Israel Government has invited an American electrical expert to study the power problem.

### Hirakud Project

The first meeting of the Hirakud Control Board set up by the Government of India in conjunction with the Government of Orissa, took place at Hirakud recently, when all the members of the Board were present. The Control Board is to take overall charge of the project including its technical and financial aspects, under the general supervision of the Ministry of Irrigation and Power. At the meeting, the chief engineer was requested to prepare a revised cost estimate for Stage I of the scheme to include the various modifications suggested by the Technical Committee.

### Plant For Brazil

For the Paulo Afonso power station in North-Western Brazil, the Westinghouse Electric International Co. has been awarded a contract to supply a third 60 MW waterwheel generator, together with associated transformers and switchgear. This contract brings to over $7 million the value of electrical equipment that has been ordered by the Companhia Hidro Electrica do Sao Francisco from Westinghouse, it is stated. Two similar sets have already been ordered, and the first is now being installed, while the second is in transit. The third unit should be delivered in mid-1954.

# *PERSONALITIES*

## IN THE INDUSTRY

The Association of Supervising Electrical Engineers announce that **Mr. C. T. Melling,** M.Sc., M.I.E.E., M.I.Mech.E., has accepted the invitation of the Executive Council to become President of the Association in succession to **Mr. T. G. N. Haldane,** M.A., M.Inst.C.E., M.I.E.E., Fel.A.I.E.E., M.Cons.E., who is retiring after two years in office. Mr. Haldane will introduce the new President at the first meeting of the London National Lecture Session on October 21. Mr. Melling was educated at Manchester Central High School and the Manchester College of Technology. Prior to becoming borough electrical engineer of Luton in 1945, he had many years experience with the Yorkshire Electric Power Co., and Edmundsons Electricity Corporation Ltd., and on nationalisation of the industry, he was appointed chairman of the Eastern Electricity Board. He has been a member of the Council of the Incorporated Association of Electrical Power Companies and the Council of the I.M.E.A. In addition, he is a past chairman of the Electrical Research Association, the Utilisation Section of the I.E.E. and of E.D.A. He is also a past president of the Luton Electrical Association and since his appointment in 1948 as chairman of the Eastern Electricity Board, the president of the Ipswich and District Electrical Association. On January 1 last Mr. Melling was appointed as a part-time member of the B.E.A.

*Mr. C. T. Melling*

Our accompanying photograph, taken at Waterloo station last Thursday, shows six prominent members of the engineering profession leaving for Southampton to board the *Queen Elizabeth* for New York. There they will attend the centennial celebrations of the American Society of Civil Engineers and a convention being held in Chicago this month. In our illustration, left to right, are: **Mr. W. K. Brasher,** C.B.E., M.A. (secretary of the Institution of Electrical Engineers), **Sir David Pye,** C.B., F.R.S., M.A., Sc.D. (President of the Institution of Mechanical Engineers), **Mr. A. S. Quartermaine,** C.B.E., M.C., B.Sc. (President of the Institution of Civil Engineers), **Mr. E. Graham Clark,** C.B.E., M.C., B.Sc. (secretary of the Institution of Civil Engineers), **Sir John Hacking,** M.I.E.E. (President of the Institution of Electrical Engineers), and **Mr. Brian G. Robbins,** M.Sc. (secretary of the Institution of Mechanical Engineers).

*The party about to leave Waterloo Station*

Under the Technical Co-operation Scheme of the Colombo Plan, the United Kingdom is making available to India for a period of three years the services of **Mr. Allan Monkhouse,** M.I.E.E. He will serve as electrical engineer on the India's Central Water and Power Commission, and will be responsible for the maintenance of electrical equipment used on river valley projects. He is the first of three electrical engineers whose services India have asked for under the Colombo Plan. We understand that the other two have yet to be recruited. Mr. Monkhouse, who is a New Zealander, has had considerable experience with water power schemes—he spent several years in Russia on the erection of electrical plant as liaison officer for the Ministry of Munitions during the 1914-18 war, and later, with Metropolitan Vickers Electrical Co., was engaged on the construction of large power stations in the Caucasus, including the massive Dnieperstroi dam. He has also made a study of rural electrification work, and since 1949 has been employed in New South Wales, Australia, as a consulting and inspecting engineer, including, latterly, work on tunnelling plant for the Snowy Mountains scheme.

**Mr. Alfred A. Smith,** general manager of the Aberdeen Corporation Transport Department since 1934, has given notice of his intention to retire at the end of this year. He has had 40 years service with the department.

*Mr. E. O. Pollack*

**Mr. E. O. Pollack** has been appointed home trade sales manager of Smart and Brown (Engineers) Ltd. Since 1946 he has been with Drubel Distributors, Ltd., but earlier he was for eight years sales manager of British Electric Domestic Appliances, Ltd., and in 1938 joined the sales staff of Thorn Electrical Industries, Ltd. Mr. Pollack will operate from 8 Rose and Crown Yard, King Street, St. James's Street, S.W.1.

The question of the position of the city electrical engineer was again raised at the meeting of the Belfast City Council on Monday. **Mr. W. J. M'C. Girvan** had given earlier notification that if the Council wished he was prepared to continue in office as city electrical engineer after September 30 next. (We have already recorded his intention to retire on that date, and the appointment of **Mr. R. P. Watson** as acting city electrical engineer for twelve months, after which the position will be reviewed.). At Monday's Council meeting, after a heated debate, it was decided by 31 to 15, four members abstaining, to refuse to accept Mr. Girvan's offer. A proposal to refer back to the Electricity Committee the latter's earlier recommendation concerning the appointment of Mr. R. P. Watson, was also rejected.

The Minister of Transport has re-appointed **Lord Hurcomb,** G.C.B., K.B.E., as chairman of the Transport Commission, **Mr. John Benstead,** C.B.E., as deputy chairman, and **Lord Rusholme** and **Sir William Valentine Wood,** K.B.E. as full-time members, for one year from September 1, 1952.

**Mr. A. M. F. Palmer,** A.M.I.E.E., technical editor and director of studies to the Electrical Power Engineer's Association, has been chosen as the Labour candidate for the Parliamentary by-election in the Cleveland division of Yorkshire caused by the death of Mr. O. G. Willey, the Labour member.

**Mr. W. J. Arscott** has been appointed by Holland, Hannen and Cubitts, as chief mechanical and electrical engineer to supervise the construction of the new Roxburgh hydro-electric station for the State Hydro-Electric Department. Mr. Arscott was formerly chief engineer with Tyne Plywood Works, Ltd., North Shields, and he has worked on contracts in Southern Rhodesia and in other parts of the world. The Roxburgh Gorge power station is planned to have an ultimate capacity of 320 MW.

At present with the Merseyside and North Wales Electricity Board as first assistant to the commercial officer of the Wallasey district, **Mr. L. R. Slinn,** A.M.I.E.E., A.M.C.T., has been selected as district commercial engineer for the Purley district of the South Eastern Electricity Board. Mr. Slinn was employed in the Manchester Corporation Electricity Department between 1932 and 1939, in the sales manager's and engineers' section and finally became lighting sales engineer in the Power Sales Section. After the war, he transferred to the London Midland Region of the British Railways in 1947, being employed in the electrical staff at their Euston headquarters, but in 1949 he returned to the supply industry to take up the post at Wallasey which he now relinquishes.

A recent visitor to the Perivale factory of Hoover Ltd. was **Mr. F. W. Cave,** managing director of the Auckland, New Zealand firm of that name, which is responsible for the distribution in New Zealand of Hoover f.h.p. motors. He is in the course of a business tour to, among other countries, Britain, Canada and the U.S.

**Mr. W. O. Jackson,** Associate I.E.E., has resigned his position as London representative for G. P. Dennis, Ltd., to take up an appointment as technical sales representative with W. Lucy and Co., Ltd. Whilst he will be concerned with the sales of all the company's electrical distribution products for part of the London area and the Eastern Counties, the primary object of his new appointment is to undertake the development and widening the sales of the firm's industrial switch and fusegear throughout the country. Mr. Jackson will operate from his home, "Cleveland," 54 Monk's Avenue, New Barnett, Herts. Telephone BARnet 4578.

## OBITUARY

**Mr. F. J. Bell,** M.I.E.E., who was vice-president and general manager of C. A. Parsons of Canada Ltd., until retiring two years ago, died on August 26, aged 79. He became Canadian representative of C. A. Parsons and Co. in 1924, after wide experience in the electrical industry in Canada.

**Mr. F. Fenn,** Assoc.I.Mech.E., one of the first executives to join I.T.D. Ltd. (in association with Austin Crompton Parkinson Electric Vehicles Ltd.), died in August 17. He was responsible for producing the first Stacatruc fork lift truck in 1946, and at the time of his death was liaison engineer for the company.

We deeply regret to learn of the death on August 30, after a long illness, of **Mr. A. Brammer,** comp.I.E.E., aged 60, general secretary of the Association of Supervising Electrical Engineers. He joined the Association in 1921 and had been general secretary ever since. During that period he has strongly presented the aims of the Association and of its members, and had become a prominent and well-liked figure in the industry. He was also a hard worker on behalf of the E.I.B.A. His passing will be deeply mourned throughout the industry.

# *Aircraft Electrics*
## *at the S.B.A.C. Show*
### Many interesting Exhibits are featured this year at Farnborough

ELECTRICAL equipment as fitted in aircraft falls into a unique category in that lightness and compactness play a far more important part than they do in similar equipment operating on the ground. For that fact alone many of the items in the "static" exhibition at this year's Society of British Aircraft Constructors' Show at Farnborough being held this week are of considerable technical interest.

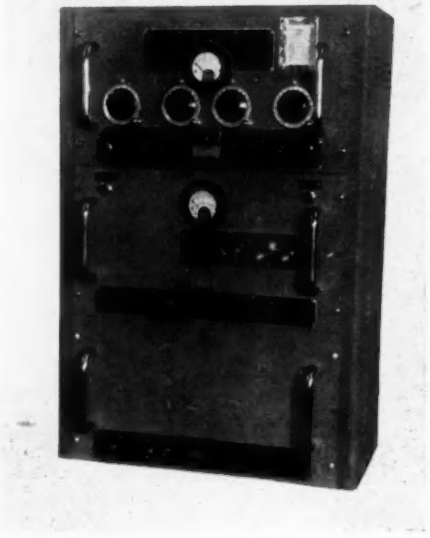
Many of the exhibits are, of course, devoted to radio navigational and communication equipment and in this field the Standard Telephones and Cables stand is of interest. An example of the STR. 9X 10-channel u.f.h. set, used as standard by some 19 air forces, is shown, together with the STR. 30 frequency modulated airborne radio altimeter, which can measure from 5,000 down to 2 ft. This is to go into full production shortly. Several other air to ground and air to air sets are also on view.

Larger sets for ground use have been developed by the Plessey Co., who have the PT 15A 50 watt v.h.f. transmitter which can operate from mobile vehicles and an unattended frequency shift keying terminal which is designed for the operation of teleprinters. Several other specialised air communication equipments are also being shown.

Among several interesting items, Ferranti Ltd. are showing the Mk 5 Gun Sight, which computes the aiming required for air to air firing and incorporates electrical control of the ranging circuits, together with ballistic compensation to cater for different types of guns and ammunition. The Ferranti Electric Gyro Horizon embodies many improvements over the Type FH 5 instrument.

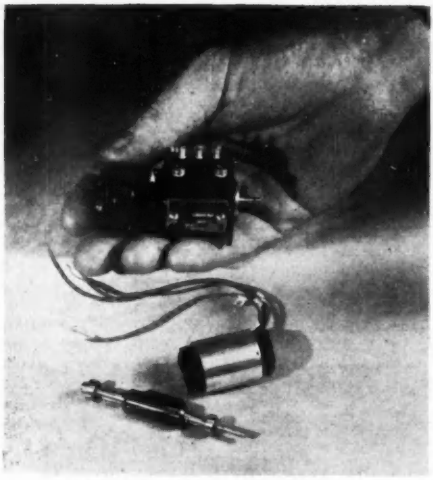
#### *Radar*

In the radar field, E. K. Cole have the EKCO Radar Approach Aid, an inexpensive form of "talk-down" airfield equipment for assisting approach under adverse weather conditions. Operation of the equipment can be carried out by one man, and its simplicity makes it particularly attractive. Another radar aid by the same firm is the Airborne Search Radar, which



*Left: This Type PT.15A V.H.F. transmitter by the Plessey Co. has an output of 50 W throughout the frequency band 100-156 Mc/s*

*Below: This G.E.C. electric oven is of the pattern fitted in the "Comet" airliners*



*B.T.H. build these miniature 115 V 400 c/s motors. Below is a typical Exide ZC type 24 V aircraft battery in its tough moulded polythene container*

gives warning of cumulo-nimbus cloud formation in the path of the aircraft, or by a p.p.i. presentation can indicate high ground ahead. In the communication field there is an 11-channel v.h.f. aircraft communication set.

Ferranti's have a microwave circuit employing a new constructional technique. A complete r.f. assembly is formed by two mating blocks of light alloy in which channels and recesses have been milled to form waveguides and provide mounts for T.R. cells or other components as required.

Of more direct interest to the electrical engineer are the items shown on the B.T.H. stand, which include aircraft magnetos, booster coils, high energy ignition units, a.c. and d.c. motors and generators, actuators, switches, circuit breakers and voltage regulators. The

increased use of higher d.c. voltages in aircraft has introduced many problems in circuit interruption and control. A range of new 120 volt contactors and circuit-breakers has, therefore, been developed suitable for use at all altitudes. The circuit-breakers are designed to rupture fault currents up to 8,000 amperes at 40,000 ft. Small-size 400 c/s a.c. motors find many applications and a comprehensive range of two-phase and three-phase motors and "drag-cup" generators is available for 115 volt duty at this frequency.

The more domestic side of air travel is catered for on G.E.C.'s stand where a humidifying unit for providing a comfortable atmosphere in the pressurised cabins of liners flying at high altitude is being shown for the first time. Standard galley equipment, including the oven as used in the Comet, is also included. Miscellaneous items are the G.E.C. heavy alloy, groups of Pirelli-General cable, approach and runway lighting units and interior lighting fittings.

## *Rectifiers*

Rectifiers plugged into the nearest a.c. power point have been widely used for providing a source of d.c. power for testing and supplying services before take-off. A new mobile "Transbooster" rectifier unit by Westinghouse Brake and Signal Co. provides 28 volts at up to 200 amps and holds the output voltage to within 1%. This unit will also provide up to 2,000 amps for starting gas turbine engines. Under these circumstances the output voltage is uncontrolled, and this has the advantage of removing the load from the starter motor at slow speed. Airborne blast-cooled rectifiers with an overall weight of 1·6 lb/kW are another branch of the company's activities.

Special lightweight rectifiers using aluminium plates are being shown by Standard Telephones and Cables Ltd. These have a power-weight ratio of 1·1 lb/kW.

Lightweight batteries are being featured by Oldham and by Chloride Batteries Ltd. while B. I. Callender's Cables Ltd. are showing a representative selection of wires and cables including "Glasil" silicone rubber insulated cables for operating temperatures up to 150° C and "Glasef" cables insulated with PTFE for temperatures up to 250° C.

The crimping principle of solderless connection developed by the Plessey Company has been further extended by the perfection of a new hexagonal form for copper and aluminium cables of the Pren and Prenal types.

# *The* BUYER'S *Column*

## Electronic Weld-timing

THE "Elcontrol" weld-timer, designed for a wide range of resistance welding machines, should make a useful contribution to the field of electronic control in industry.

*"Elcontrol" weld-timer, showing prominent dial control for easy time setting*

Produced by ELCONTROL, LTD., 10 Wyndham Place, W.1, it is designed to operate from the closing of a weld pressure switch fixed to the welder. Closing this switch starts a single weld, the welding current contactor being controlled by the timer relay so that current passes only for the time corresponding to the control dial setting. Should power be applied to both welder and timer simultaneously, before the timer has had time to "warm-up," a delay prevents the welding contactor closing prematurely.

Risk of shock to the operator is minimised as the initiating circuit operates at low voltage and, in consequence, the control can be used to advantage for portable welding tongs. It is pointed out that, when fitting an "Elcontrol" timer, a suitable contactor in addition to the initiating switch is required. This can be supplied at extra cost. Marketed at £14, the timer is designed for use on 200/250 V a.c. or d.c. supply, and has a timing range of 0·1 to 3 seconds.

## Reductions in Price

FROM September 1, a reduction in the price of their Model 400 cleaner has been announced by THE HOTPOINT ELECTRIC APPLIANCE, CO., LTD., Crown House, Aldwych, W.C.2. Stated to be now little more than pre-war, the price of the cleaner is now £12 19s. 6d., plus purchase tax of £6 9s. 9d., whilst attachments are now available at £3 plus tax of £1 10s.

A revision in the list prices of their watertight, prismatic type tungsten lamp bulkhead fittings has been announced by EKCO-ENSIGN ELECTRIC LTD., Southend-on-Sea, Essex. Reductions are, for Cat. Nos. L592 and L593, from 36s. 8d. to 33s. 6d. each; and for Cat. No. L594, from 38s. to 33s. 6d. each.

Further reductions have also been made in the prices of the majority of their present range of fluorescent lamp starter switches. Both revisions came into effect on September 1, 1952.

Messrs. R. A. LISTER AND CO., LTD., Dursley, Glos., have announced a reduction in the price of their "Start-o-matic" diesel generating set. Amounting to approximately 12½%, the reduction, which became operative on September 1, is from £433 to £375.

## Dark Room Ventilation

MORE than one dark room has suffered from inadequate ventilation to obtain complete exclusion of light. "Air-flow" window fans, fitted with a special light-proof attachment, can be used to satisfy the dual requirements of utter darkness and sufficient fresh air. Made by FENTON, BYRN AND CO., LTD., Air-flow Works, 21 Berrylands Road, Surbiton, Surrey, these fans are claimed to have a capacity of 20,000 cu. ft/hr. Constructed from light alloy, the fan is nine inches in diameter, and revolves at 1,200 r.p.m. It is available for 200/250 V a.c. or d.c. and, rated at 45 watts, should provide silent and efficient ventilation.

## New Fuses for Lighting Columns

ADDING to their range of distribution equipment, W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., 51-53, Hatton Garden, E.C.1, have introduced two compact ironclad service fuses, specially designed for use in lighting columns. Common to both types is the fuse unit which can accommodate either a rewireable fuse element or cartridge fuse, with a neutral link. Also in both is a detachable sealing chamber provided with a brass sealing gland.

*3¾ in. wide single entry fuse for lighting columns*

One of the types is single entry and the other permits looping-in. Designed for either three twin cables or one twin and one three-core cable for the connection, the loop-in type is 5¾ in. wide, whereas the single-entry type is only 3¾ in. wide. In the latter type 0·0145 sq in. conductors may be used for both incoming and outgoing cables. VR tails also of this size are taken out through the lower side of the case in both models, although provision is made for them to be taken out through conduit screwed into the boss on the upper side

## New Translucent Light Fittings

DESIGNED for power stations, aircraft hangars and similar lofty exteriors, a new series of industrial translucent units has been recently introduced by HOLOPHANE LTD., Elverton Street, S.W.1. These units, embodying prismatic reflectors are designed to provide, by light control, an adequate degree of ceiling brightness without reducing illumination on the working plane.

*Single unit prismatic reflector of Holophane's lighting fittings*

Two sizes of fitting are available; single units for 500 or 1,000 watt filament lamps (or equivalent mercury discharge lamps); and twin units, for both filament and mercury discharge lamps. Using the two types of lamp together is claimed to provide a colour blending approaching that of daylight. Reflectors having internally reflecting prisms are made from glass resistant to heat and deterioration.

The three reflector types which are manufactured are classified in light distribution; extensive, intensive and focusing. Construction of metal parts is of heavy gauge steel, rust protected, and they are finished in light grey or aluminium depending on the type of fitting. To ensure adequate cooling for wiring, construction is designed to provide maximum ventilation. Mounting for single units may be by chain or conduit: for twin units chain is recommended, and suspension hooks are provided for this purpose.

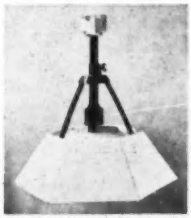
## Measuring Equipment

IN the range of electronic laboratory equipment manufactured by AIRMEC LABORATORIES, LTD., High Wycombe, Bucks, their portable stabilised power supply unit should find extensive application in this and other fields. Operating from 100/130 V or 200/250 V a.c. mains, this unit is claimed to provide a stabilised direct voltage, continuously variable from 200 to 350 V, and in addition an unstabilised centre-tapped 6·3 V a.c. supplying 5 amps. Enabling a continuous check to be made on operating conditions, current and voltage output meters are incorporated.

Featured also in "Airmec" products is a time interval meter, designed to measure intervals from 10 millisecs to 60 secs, and can be used in laboratory, workshop or factory where time delays in electrical components have to be accurately measured. A moving coil meter with a logarithmic scale indicates the length of time interval being measured. In addition to single time intervals, the machine is said to be capable of the integration of a series of short time intervals over a comparatively long period. Other instruments include a millivoltmeter for measuring a.c. voltages from 0-1,000 mV in three ranges over a frequency range of 30 c/s to 10 Mc/s; and a phase-measuring unit designed for measuring phase-shift and gain of amplifiers, filters and equalisers in frequencies from 50 kc/s to 20 Mc/s.

## Hexagonal Shade for Better Lighting

WITH its open top the "Wildbore" hexagon shade is claimed to present a unique design by utilising the ceiling as an additional reflector and thus giving a balanced combination of direct and indirect illumination. Moreover, the wide opening at the top is designed to permit maximum ventilation, reducing the heating of the lamp and wiring.



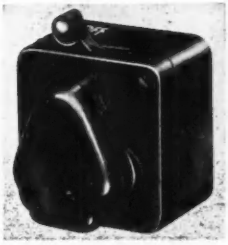
*The "Wildbore" shade, held in position on hooks at the end of each spring strip*

Made by J. E. WILDBORE, LTD., 6 Peter Street, Oldham, Lancs., the shade can be fitted to take one, two or three coiled-coil lamps of any wattage up to a total of 200 W. It is pointed out that with the company's twin holder, to safeguard against one lamp failing, this fitting is particularly useful for corridors or over working machinery. Fitted with a standard bush suitable for ¾ in. conduit drop, the shade is adjustable on the conduit permitting the 20° cut-off to be obtained according to the wattage of lamp in use. For ½ in. conduit a reducing bush can be supplied on request.

Wiring boxes or dust visors need not be used as dust is carried through by air circulation, but when cleaning is necessary, the shade may be easily detached from its triangular support. This support is also stated to offer protection to the lamps if the shades are being cleaned *in situ* using long-handled brushes. For fixing to the ceiling, each lamp is fitted with a "Protectafil" shock absorber, with floating balance suspension.

## Lundberg Surface-type Switch Socket

THIS column in the issue of August 7 contained details of new Lundberg 5 amp. a.c. switch sockets made by SIMPLEX ELECTRIC CO., LTD., Broadwell, Oldbury, Birmingham, including an illustration of the flush-mounting pattern. The accompanying illustration shows the surface-mounting pattern (Cat. No. 51200). Dimensions of this type are 2 in. by 2 in. by 1 $\frac{5}{16}$ in. Four knockouts are provided and the switch, marketed at 10s., is finished in brown synthetic resin.



*5 amp switch socket for surface mounting*

### Cycle Lamps with New Finish

STRIATIONS in the beam of a cycle lamp are often an undesirable feature and in an attempt to provide more uniform light distribution, the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, have produced a new Osram cycle lamp with a "granulated" finish.

Originally the demand was for a frosted or satin-etched finish but the small size of bulb made it virtually impossible to get satisfactory results. Consequently the new type of bulb, which is moulded, was evolved. Osram 6 V, 0·3 amp and 6 V, 0·5 amp lamps in the 15 mm bulb size with M.E.S. caps have so far been produced with this finish and are generally available. In the near future it is hoped to produce similar lamps of the same rating with 18 mm bulbs and S.C.C. caps.

### Distribution Type Switchgear

AN interesting and useful feature of "Ottermill" distribution type metal-clad switchgear is the relative ease with which an original installation may be extended. Made by G. M. ENGINEERING (OTTERY ST. MARY) LTD., The Otter Mill, Ottery St. Mary, Devon, their oil circuit-breaker units consist basically of a pedestal mounted bus-bar chamber complete with bus-bars, oil circuit-breaker, neutral link (if required), and cable entry. Provision is also made for meters and selector switches. In the fused switchboard type, metal-clad switchfuses are mounted above and below the bus-bars and supplied from them.

When assembling the complete distribution board, units are mounted side by side and the bus-bars in each coupled together by connecting links. In this way additional units may be added to either end of the board with the minimum of inconvenience. Designed for use on 440 V, circuit-breakers can be supplied for standard current ratings in a range from 100 to 600 A and bus-bars are available in five sizes from 250 to 1,000 A. Switchboards incorporating both o.c.b. panels and fused-switch sections are also made, and for special purposes units can be constructed to customers' requirements.

### "The Early Morning Cup"

YOUNGER brother to the "Tea Boy," an automatic tea-making set manufactured by SMITHS ENGLISH CLOCKS, LTD., Waterloo Road, Cricklewood, N.W.2, which was mentioned in this column in the issue of August 14, is the "Junior Teaboy." Consisting of a "New Callboy" clock and chromium-plated kettle, "Junior" can be used with your own teapot in exactly the same way as the "Teaboy" to make your morning cup of tea at your leisure. The price, including tax, is 9 gns.

## TRADE PUBLICATIONS

WIRING IN THE "COMET."—B.I.C.C. Bulletin No. 8, the current issue of a quarterly publication by British Insulated Callender's Cables, Ltd., 21 Bloomsbury Street, W.C.1, is devoted in the main to a pictorial review of the "Comet" jet airliner. Considerable attention is paid to wiring and electrical services in Britain's newest achievement in fast, luxury air travel.

CABLES.—Four new publications dealing with the products of The Telegraph Construction and Maintenance Co., Ltd., 22 Old Broad St., London, E.C.2, feature p.v.c. insulated and sheathed cables (P.V.C./B1), multi-core aircraft cables (M.C./1), double screened and non-microphonic cables (Y.G./1) and helical membrane radio frequency cables (Hur/1).

RADIO AND TELEVISION.—The 1952-1953 television and radio programme of the General Electric Co., Ltd., Magnet House, Kingsway, W.C.2 has now been published in brochure form by the company. It sets out the plan of campaign and the "weapons" it is going to use.

THREADING DIES.—The "Identification of Threading Dies" an extensively useful handbook for machine tool users and operators has now had a third edition which includes and illustrates thread rolling dies newly added to the range of products of W. H. A. Robertson and Co., Ltd., Lynton Works, Bedford.

POWER TOOLS.—New Catalogue No. 496 entitled "Power Tools" has been issued in two versions, one by Alliance Wholesale Ltd., 24-30 Gillingham St., London, S.W.1, and by Simpson Baker and Co., Ltd., an associated company.

NON-DRAINING P.I.L.C. CABLES.—Recognising the drawbacks of fluid compounds in cables with vertical runs, W. T. Glover and Co., Ltd., Trafford Park, Manchester 17, have given details of the design and use of cables containing a non-draining compound for voltages up to 11 kV.

LOW CURRENT RECTIFIERS.—Special high voltage "SenTerCel" rectifier plates recently developed by Standard Telephones and Cables, Ltd., Warwick Road, Boreham Wood, Herts., have permitted the manufacture of a new type of tubular rectifier. This publication, F/SRL.11, lists performance details of these "K" and "N" type units.

"ISOLATION OF VIBRATION AND NOISE."—A description of methods employed by W. Christie and Grey, Ltd., 4 Lloyds Avenue, E.C.3, to prevent transference of machine vibration to the building. Several types of antivibrator are discussed, with illustrations of varied applications.

CERAMIC CAPACITORS FOR TRANSMITTER WORK.—Describing their latest development, "Hi-Load" ceramic transmitter condensers, technical Bulletin No. 26, by The Telegraph Condenser Co., Ltd. (Radio Division), North Acton, W.3, provides data on sizes, capacitance and rating of these capacitors, including graphs relating kVA and current consumption to frequency.

# The WEEK in NEWS

## RESUSCITATION IN THE UNITED STATES

MUCH attention has been given in the United States in recent months to the arm-lift back-pressure method of artificial respiration, as being more effective than the Schafer method. A committee of electricity supply company medical directors is now reported to have confirmed that the former method is the most generally adaptable one at the present time. However, they note that there are particular problems presented in some electrical shock cases which are not present in asphyxia and immersion incidents, and these would require the use of other methods (such as Schafer) in which a rescuer has been trained. In particular, continuation of the pole-top method, with the advice that the victim be brought down as soon as practicable, is recommended.

The accident prevention committee of the Edison Electric Institute, in endorsing these recommendations, advocates continued training in the prone-pressure and pole-top methods as well as arm-lift techniques.

## S.W. London Branch win A.S.E.E. Cup

SOUTH West London Branch of the Association of Supervising Electrical Engineers has been awarded the Silver Branch Merit Cup of the Association in the 1951-52 competition.

This branch gained the highest combined marks for the best all-round record of activities during the session including educational activities, attendances at meetings, percentage increase in membership and efficient management of branch affairs.

The Nottingham and Leeds branches tied for second place.

## 1953 Electrical Exhibition Announced

*March 25 - 29 at Earls Court, London*

FOLLOWING the success of last year's Electrical Engineers' Exhibition held at the New Horticultural Hall, Vincent Square, the A.S.E.E. have now arranged for a more ambitious exhibition to be held in the West Brompton Hall, Earls Court, from March 25 to 29, 1953. The exhibition will be on a national basis, and is being supported by the B.E.A.M.A., the B.E.A. and the E.R.A. Preliminary information shows that to date some two-thirds of the available space has already been booked, and that many of the larger manufacturing firms are taking stands. The Committee will be the same as last year.

## RESALE TO STOP

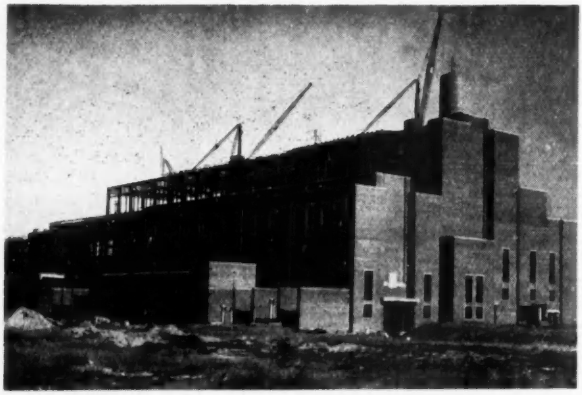
IN view of complaints made in this country from time to time about the resale of electricity by landlords to tenants, there is interest in a recent New York Supreme Court judgment. On the basis of the Public Service Law of N. York, the court held that the practice of sub-metering was "parasitic and undesirable." Profits made by the sub-meterer would, in his absence, be available for the reduction of rates to other consumers. The court upheld a Commission order authorising an electricity supply company to cease selling current to landlords for resale to residential tenants.

## HYDRO POTENTIAL OF LABRADOR

LABRADOR and Newfoundland have a greater hydro-electric potential than at present developed in all the rest of Canada, the Hon. Joseph Smallwood, Prime Minister of Newfoundland, told British industrialists last week. He was suggesting the formation of a composite British company to develop the resources of these provinces, which include vast quantities of iron ore, manganese, high-grade timber and, it was suspected, uranium, copper, lead and zinc. Development projects in Newfoundland included the opening of a new asbestos mine and a copper mine. In development work great use had to be made of aviation for survey and transport.

## The First Half-Century

The Fischer petrol-electric omnibus is at present undergoing a series of trials upon roads in the vicinity of London. The omnibus gives one the idea of great power as it travels majestically at a regular speed over every variety of road surface. It is remarkably quiet when running and is perfectly quiet when the engine is stopped and power is taken from the accumulators to drive the car electrically. We shall watch with interest the future of the Fischer system when it is tried under everyday conditions in the London streets. If, however, the omnibus companies do not hurry up with their promised electric automobile service they will be anticipated, for it is reported that a syndicate is being formed to place a number of light electrically-propelled buses on the principal London routes at a uniform fare of twopence for any distance travelled.—*From our issue of September* 4, 1902.



*Drakelow power station is now rapidly taking shape. It now rises well above the trees of the surrounding parkland. When completed this "A" station near Burton-on-Trent will add 240 MW to the Grid*

## OFFICIAL PUBLICATIONS

MINISTRY OF SUPPLY. Government Dept. Elec. Spec. No. 24 Cable Drums, revision. H.M.S.O 6d.

D.S.I.R. *Selected Government Research Reports on Ceramics and Glass, Vol.* 10. H.M.S.O., 25s.

HOUSE OF COMMONS PAPERS, 288. *Select Committee on Estimates. Tenth Report with Minutes of Evidence later for Sub-committee B on Rearmament.* H.M.S.O. 6s. *see page* 402

B.S.I. BRITISH STANDARD 1885:1952 *Synthetic Resin Bonded Paper Insulating Tubes (rectangular cross-section) for electrical power circuits up to* 1,000 *V.* British Standards Inst. 2s. 6d.

MINISTRY OF LABOUR: *Electrical Accidents and their Causes.* H.M.S.O: Price 3/- *see page* 396

## Driver-Harris stage International Conference

THE fourth international gathering of the Driver-Harris organisation is due to take place at Alderley Edge, Cheshire, on October 8, 9, and 10, and this year will constitute a technical development conference.

Greater part of the meeting will be taken up by discussions on a number of technical papers dealing with the various aspects of the Driver-Harris alloys and new fields of application.

## *Dunlop Adopt Electrostatic Spraying*

AN electrostatic spray plant has been installed at the Dunlop tennis racket factory, Waltham Abbey, the first in the world yet known to use this method of spraying rackets. As the racket frames are carried on a conveyor through an electrode system charged at 130 kV, the lacquer particles pick up a charge of their own. At this high voltage there is enough moisture in the wooden frames for them to act as conductors and they, therefore, attract from all directions lacquer particles, 40% of which with ordinary hand spraying would have passed out of the plant and been wasted. The plant thus saves thousands of pounds a year, by using only 60% of the lacquer required in hand spraying.

## *Nurse-Patient Intercom*

AN interesting development of the aircraft intercommunication system has recently been installed in the Catherine de-Barnes Maternity Hospital at Solihull, Birmingham.

Installed by Hadley Sound Equipments, Ltd., of Smethwick, the system serves a total of 30 beds and costs about £400.

In the duty room used by the sister or senior nurse in charge is a loudspeaking master unit incorporating an indicator light for each bed which has a specially designed robust speaker/microphone unit, small enough to go under the pillow without causing discomfort to the patient. On pressing the single spring-loaded press-button switch the patient hears a low tone indicating that the call note is being transmitted to the sister's office and, at the same time, the appropriate light glows on the master unit panel.

The sister then connects to the calling extension and two-way conversation is immediately established.

*A new installation of 65 Metrovick "SO 50" lanterns with 140 W sodium discharge lamps has recently been completed in the Dewsbury Road, Leeds. A busy thoroughfare which carries a considerable amount of traffic for Manchester. Dewsbury Road is unusual because of its exceptional width, 60 ft from kerb to kerb. In our illustration, looking towards Leeds, some of the lanterns, mounted on existing tramway columns, are seen*

# U.S. VISIT FOR 165 ENGINEERS

ONE hundred and sixty-five European engineers have left Paris for New York to begin a month's visit exchanging ideas with their U.S. counterparts and to study the latest developments.

The engineers from 12 European countries will be split up into ten groups.

The visit has been arranged in connection with the Centennial of Engineering in Chicago to mark the foundation of the American Society of Civil Engineers. The mission's programme has been divided into four phases. The first will consist of a general non-technical introductory seminar on the economic, social and industrial sides of American life. This will be followed by the Centennial itself, when for ten days the participants will attend lectures, visit plants and museums, and exchange views on their special interests.

The third phase of the programme will be two weeks of visits to plants, professional associations and outstanding engineering developments in such fields as flood control, hydro-electric installations, bridge construction and scientific farming. For this phase, the team will be split into some 30 sub-groups according to their industrial backgrounds and interests.

The last phase will consist of discussions with representatives of government bureaux and agencies, when the results of the mission will be evaluated.

## *Second Summer School on Welding*

SOME 275 students attended the second Summer School organised by the British Welding Research Association at Ashorne Hill, Leamington Spa.

Lectures and demonstrations relating to practical aspects of welding were included in the first week, whilst the second week was devoted to more specialised subjects, such as metallurgy and physics of welding, testing, inspection, design by analysis and experiment, etc.

Over seventy lectures were given by a large group of scientists and engineers from industry, the universities and from research organisations. Member firms of the Association provided equipment.

Consideration is being given to the proposal of holding a third school in the spring of 1953, but announcements will be made later.

*Dr. A. A. Wells (B.W.R.A.) and Mr. P. Whitaker in conversation with the director of B.W.R.A., Dr. H. G. Taylor and Dr. J. H. Paterson at the recent summer school*

## EASTERN BOARD URGE DOMESTIC USE OF FLUORESCENTS

A SERIES of advertisements soon to appear in newspapers published in the Eastern electricity area on the instructions of the Eastern Electricity Board have been addressed to the housewife, urging the use of fluorescent lighting.

With the slogan "See your kitchen in a better light," the advertisement features line sketches of a fluorescent fitting and the orthodox "before and after" drawing of Mrs. Everywoman. The benefits of fluorescent lighting, i.e. shadowless, economical in use and easy to instal, are noted.

## Engineeering Evening Studies during 1952-53 Session

AS the autumn rapidly approaches educational establishments are preparing their winter syllabuses.

Latest to come to hand and of interest to our readers are the General Regulations, 1952-53, calendar and timetable and fees for examinations of the City and Guilds of London Institute, their Regulations and Syllabuses for examinations in telecommunications and electrical subjects.

The prospectus of the Polytechnic, Regent Street, Electrical Engineering Department shows that courses in Electrical Engineering and Telecommunications are provided covering a wide field. Perhaps the most important activities include preparation for the following examinations:

(1) National Certificates both Ordinary and Higher; (2) B.Sc. (Eng.); (3) A.M.I.E.E. Parts A and B; and (4) the City and Guilds of London Institute.

In addition the laboratories are available for those wishing to prepare theses for the Higher University Degree or to pursue an advanced study of a particular subject.

The Polytechnic Laboratories are well-equipped with modern apparatus mostly designed for advance experimental work and research.

## Welsh Industries Fair

FORTHCOMING (September 10-20) Welsh Industries Fair at Sophia Gardens, Cardiff, annual shop window for Welsh manufacturers is this year concentrated on the theme of Housing, the Building and Allied trades.

Opened Wednesday, September 10, by Sir David Maxwell Fyfe, Q.C., M.P., Home Secretary and Minister for Welsh Affairs, the exhibition will show daily during the hours 12 noon to 8 p.m., the products of some 60 firms which can come under the classification "Made in Wales."

Among the exhibitors are Rediffusion (Wales) Ltd., Hoover, Ltd., Thorn Electrical Industries Ltd., Richard Thomas and Baldwins, Ltd., Gulf Radiators, Ltd., N.C.B., British Railways, and the Ministry of Housing and Local Government.

## DESIGN ENGINEERS FOR ATOM POSTS

THREE engineers are required by the Ministry of Supply to join A.E.R.E. at Harwell for design work on nuclear power systems either as individual designers or heads of research teams.

Top position has a salary of £1,454 p.a.. whilst the others rise to £1,218 or £927 p.a.

Applicants for these posts, who must be British and of British parentage, are expected to have served a recognised engineering apprenticeship and be corporate members of the I.Mech.E. or I.E.E., or hold equivalent qualifications.

They should have had design office experience, preferably in some form of chemical process work and in the erection and testing of process work.

As readers will know, work on the use of atomic piles for heat production in power stations and ships is one of the most important tasks at Harwell.

Among atomic piles under consideration are a slow neutron enriched reactor for ship propulsion, a slow neutron natural uranium reactor for electricity generation, and a fast or intermediate reactor.

## *Dundee - Aberdeen free from Load Shedding*

CHAIRMAN of the Dundee District Committee of the Scottish Board for Industry, Mr. J. Murray Prain, announced last week that the 10% reduction in peak hours which he said was being asked from industrial firms in Scotland this winter will not apply in the Dundee, Aberdeen, Highlands and island areas.

He mentioned that the board had agreed to accept from the North of Scotland Hydro-Electric Board a bulk supply of some 185 MW. It would not be necessary for firms in Dundee, Perth, Angus and Perthshire to submit lighting schemes. The Hydro-Electric Board had, he said, a rota of load-shedding ready for operation in case of emergency.

## *Tax off Loudspeakers*

AFTER consultation with the Radio Industry Council the Customs and Excise Authorities have decided that loudspeakers of other than the cone type i.e., pressure type, are not chargeable with Purchase tax.

All separately supplied cone type speakers whether mounted or not up to 12 in. diameter are subject to tax. Speakers supplied as parts of complete p.a. or communication systems, however, are exempt, but replacement speakers will be liable to tax as in accordance with the aforementioned.

Loudspeakers incorporated in radio receivers are not separately chargeable with tax, but the tax value of a chargeable set must continue to include the value of any incorporated speaker whatever its type or size.

## Coronation Re-decoration

IN view of the approaching Coronation, the Dorchester Hotel has modernised its American Bar. This work involved extensive alterations, among which was included a complete rearrangement of the lighting system. The main illumination is now provided by cold cathode tubing concealed behind a continuous cornice, the light being reflected by the ceiling. Two tubes are used—gold and peach—and independent control can be exercised. It is interesting to note that the original air-conditioning plant for the bar, installed some 14 years ago, is still being used in view of its trouble-free history. The lighting was carried out by Claude-General Neon Lights, Ltd., the full air conditioning being the responsibility of Brandt and Odell, Consultants.

*The American Bar at the Dorchester Hotel in Park Lane, London, has recently been redecorated and re-furbished in time for the Coronation in June next year*

*Clever advertising combined with charity resulted from the Ekco float in Southend's recent carnival. The Ekco jeep towed a trailer covered with 5,000 multi-coloured balloons which were distributed to children along the route*

## PHILIPS TO MAKE GRAMOPHONE RECORDS

IT has been announced that Philips Electrical, Ltd., have entered into a manufacturing agreement with the National Plastics Group for the pressing of gramophone records. The National Plastics Group have a number of factories, and pressing operations will commence at Avenue Works, Walthamstow, early in 1953.

This follows the previous announcement last December that Philips Electrical, Ltd., would be entering the gramophone record field in 1953 for the exploitation of the American Columbia and their own record libraries.

Philips Electrical, Ltd., are now building an organisation to handle this side of their activities.

## Wild-Barfield invite Students to their Works

DURING the winter each year, Wild-Barfield Electric Furnaces, Ltd., welcome parties of up to 30 senior engineering students from technical colleges and research establishments, to their Watford Works, where an interesting and extensive tour is arranged.

The tour includes a visit to the production shops where electric furnaces from laboratory units to full scale production furnaces and induction heating equipment can be seen in all stages of manufacture. The metallurgical and chemical laboratories provide ample opportunity for the study of research methods and equipment, whilst the furnace development section affords the visitor scope for seeing many new heat-treatment processes and prototypes in the course of development.

An invitation is extended to visitors from September 1 to May 31, 1953, on any weekday afternoon (Monday to Friday), but early application is advised.

## *Marconi Marine at Aberdeen*

BECAUSE radio equipment, particularly R/T and the echometer equipment, has reached a high level of popularity in the fishing industry, Marconi International Marine Communication Co. Ltd., have opened a new depot in Regent Road, Aberdeen.

Twenty years ago Scottish business of the firm was conducted by the Glasgow centre, but the demand for equipment has increased so much among the northern Scottish fleets and particularly the herring fleets centred in the Aberdeen area that the firm decided another main depot was required here.

For a few years after the war the company conducted its business from five buildings in different parts of the "Granite City." In 1950 the firm found the premises in Regent Road conveniently near to the Fish Dock, but entirely unsuitable as it stood. The building was, therefore, gutted and reconstructed to achieve the greatest efficiency of the marine centre.

With the subsidiary bases in Peterhead, Buckie and Fraserburgh the service now rendered by the organisation is of a very high standard. Mr. V. G. Oastler is manager of this Aberdeen depot.

## NEWS IN BRIEF

South Wales E.I.B.A. Golf Competition final is being held on Thursday September 11, at the Southerndown Golf Club, Bridgend, Glamorgan, starting at 10.0 a.m. Further particulars are obtainable from the secretary L. N. A. Davies Esq., M.A., c/o the South Wales Electricity Board, St. Mellons, Cardiff.

The Birmingham Branch Area of E.I.B.A. are holding a Carnival Dance at the Magnet Club, Witton, Birmingham, on Friday, October 3, 1952. Applications for tickets should be addressed to L. Wall, Esq., Hon. Sec., E.I.B.A., Birmingham Branch, Electrical Components, Ltd., 102 Snow Hill, Birmingham 40.

Increased road taxes are to be paid by all mechanically propelled road vehicles in Eire. Electric tricycles are charged £8 and vehicles not carrying a driver, i.e. trolleys, etc., £6.

Girl Guides in the Glossop, Derbyshire, area now pass for their proficiency "badges" in cookery and laundry, using electric cookers and washers. The N. Western Electricity Board No. 3 Sub Area manager has agreed that Glossop Service Centre should be used.

# Electric Supply News . . .

**Battersea**

Work has now started on the erection of a fourth 337 ft. chimney at Battersea power station. This work is in connection with the extension of the "B" station, where a 100 MW Metropolitan-Vickers turbo-alternator and six 425 k lb/hr Babcock and Wilcox boilers are to be installed.

**Gateshead**

An electricity supply is to be afforded to Second, Third and Fourth Streets by the North-Eastern Electricity Board. A petition was drawn up by people living in the area, and the Electricity Board has announced that as additional capital has been made available, it had been agreed to include the work in the current year's programme.

**Northumberland**

The County Council has received an offer from the North-Eastern Electricity Board to supply electricity to Windmill Farm at a cost of £1,730. The Council contends that this sum is excessive especially as cables pass close to the farm. The Council added that the tenants on the farm would not accept the terms, and the electricity board has been asked to make a "substantial reduction" in the estimate.

**N Scotland**

By re-designing part of their Glen Moriston hydro-electric scheme, the North of Scotland Hydro-Electric Board have been able to save about 1,400 tons of steel and 25,000 tons of cement, materials which have become scarcer since the scheme was published in 1948. The original Moriston scheme which was passed by Parliament in 1949 proposed the construction of four reservoirs and five power stations.

In lower Glen Moriston there were to be a small reservoir, aqueduct and power station at Dundreggan, a larger reservoir from which water was to be led by a tunnel two miles long to a power station at Invermoriston, and a subsidiary power station at Livishie. The start of construction was delayed by the Government's restriction on capital investments and in the meantime, the Board's engineeers have been examining methods of saving scarce materials.

It has been decided to dispense with the lower dam, the aqueduct and the original power station at Dundreggan. The station which was to have been built at Invermoriston will now be built underground almost vertically below the Dundreggan dam with the turbines discharging into a tunnel leading to Invermoriston. The subsidiary generating station which under the original scheme was to have been situated at Livishie near the lower Moriston dam, will now be situated above the Dundreggan dam with the turbines discharging into the new lock formed by it. It will not now be necessary to construct a 132 kV line between Dundreggan and Invermoriston; there will also be advantages from the point of view of amenity and fishing, etc. These changes will be carried out without any effect on the annual output of the scheme which is estimated to be about 214 million units. In upper Glen Moriston, where there will be two reservoirs and two power stations, work has begun on the construction of dams at the outlets of Loch Cluanie and Loch Loyne and the driving of the tunnel from Loch Cluanie to a power station near the Ceannacroc. As the main 16,000 kW turbo-alternator at the Ceannacroc power station in upper Glen Moriston is to be a duplicate of the two machines at the Invermoriston generating station, the Board have also decided to build this station underground.

## LIGHTING SCHEMES

**Blackpool.**—M.o.T. has reduced from £59,200 to £12,000 a proposed street lighting improvement scheme. The original plan provided for £39,300 being spent on first priority roads and £19,900 on second priority, and altogether 57 streets were to have benefited. The Highways Committee has now recommended that the £12,000 should be spent on improving the lighting in Layton Road, Collingwood Avenue, Beech Avenue, Park Drive, South Park Drive, Marton Drive, Watson Road, Tyldesley Road, Hornby Road, and Red Bank Road.

**Durham.**—T.C. to submit to M.o.T. scheme to cost £2,420 for lighting in Sutton Street, Alexandria Crescent, and Crossgate Peth.

**Halifax.**—T.C. recommended to approve a two-part scheme for the installation of electric lighting from North Bridge to the borough boundary at Northowram. Estimated cost £6,942.

**Leicester.**—T.C. propose to apply for consent to borrow £20,000 for providing street lighting on various housing estates.

**Leigh (Lancs.).**—T.C. submitting to Ministry for approval schemes for improved lighting in Chapel Street and Queen Street.

**Ormskirk.**—The Ministry has approved the U.D.C.'s scheme for improved street lighting to cost £3,300.

**Rowley Regis.**—T.C. recommended to approve a scheme, to cost £4,474, for electric street lighting in Reddal Hill Road, High Street, and Forge Lane, Cradley Heath.

**Uxbridge.**—U.D.C. has approved scheme for re-lighting Hillingdon Road at a cost of £1,650. Scheme for improved lighting in Cowley Road, High Street and High Road, Cowley, costing £4,500, to be submitted to M.o.T. for approval.

**Welshpool.**—The T.C. is asking the Ministry for loan sanction to cover the erection of 60 electric lamps in various roads.

# Company Activities . . .

**Britannia Electric Lamp Works Ltd.**

Trading profit for the year ended March 31 last is £130,179 (*£134,098*). After depreciation and taxation the net profit is £38,745 (*£50,356*). To minority interest subsidiary £2,208 (*£3,339*), plant replacement reserve nil (*£6,080*), general reserve £8,750 (*£19,580*). The dividend is again 12½%, and £62,495 (*£46,192*) is carried forward.

**Electric Furnace Co.**

The consolidated trading profit for the year ended March 31 last is £139,463 (*£119,538*), plus £2,638 (*£3,313*) other income. After charging depreciation, directors' emoluments, and taxation of £49,191 (*£45,381*), the group net profit is £52,085 (*£37,673*). The final Ordinary dividend is again 5½%, making 10%.

**Hackbridge Cable Holdings**

For the year to March 31 last, after charging taxation of £90,903 (*£122,170*), depreciation £36,462 (*£38,327*), etc., combined net profit is £87,009 (*£71,247*). The final Ordinary dividend is 12½% again making 20%. Profit retained by subsidiaries £27,965 (*£10,843*), and carried forward by Hackbridge Cable Holdings £3,505 (*£3,524*). Improvements and additions to the means of production have been continued during the year at a cost of £166,361, states Mr. Claude I. Steen, chairman. There is a very good volume of work in hand and in prospect. The current year has commenced favourably and the monetary value of the turnover is again substantially up.

**Larmouth and Bulmer**

The profit for the year to March 31 last of this firm which manufactures cable making plant etc., is £47,960 (*£42,225*). After charging depreciation £2,565 (*£2,068*), taxation, including £1,000 E.P.L. £26,215 (*£23,219*), off patterns £500 (*same*), off goodwill £1,000 (*same*), etc., the net profit is £13,976 compared with £11,928 for the previous year. The final Ordinary dividend is 10%, again making a total of 17½%.

**Oldham & Son, Africa, Ltd.**

The trading profit for the year to March 31 last, is £77,683 (*£52,686*). The dividend is again 7½%, and there is £22,556 (*£15,366*) carried forward.

**Phoenix Telephone and Electric Holdings**

The consolidated net profit, after taxation, for the year to February 29 last is £44,787. The dividend is again 10%. To general reserve of subsidiary £35,000, and carried forward, £10,895 (*£19,151*).

**Ransome and Marles Bearing Co.**

For the year ended June 30 last, the net profit is £357,755 compared with £345,456 for the previous twelve months. This figure is struck after charging taxation of £430,000 (*£326,000*) and depreciation of £187,926 (*£119,621*). The final Ordinary dividend is 12½%, plus bonus 5%, again making a total of 25% for the year. There is £100,000 (*same*) transferred to general reserve, £55,151 (*£68,026*) for future taxation (net relief from initial allowances), and £10,000 (*same*) to pension fund trustees.

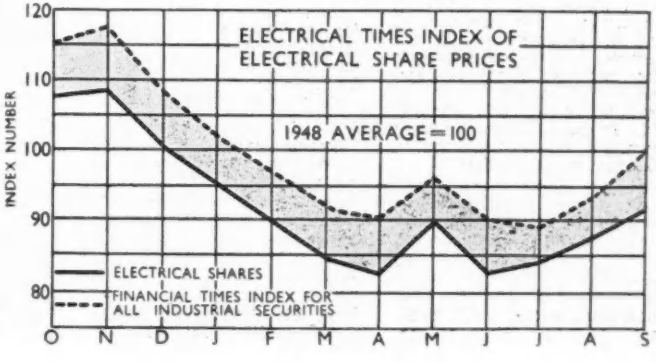
**Richardsons, Westgarth & Co.**

There is an increase of £131,578 in the consolidated trading profit at £814,568 (*£682,990*) for the year ended March 31 last. After charging depreciation of £88,458 (*£84,503*), taxation (including £15,050 E.P.L.) £479,470 (*£356,900*), the parent company's net profit is £247,361 (*£240,851*), (and retained by subsidiaries £1,410 (*£935*). To general research £150,000 (*£125,000*), and superannuation reserve £25,000 (*same*), and after payment of dividend of 12% there is £122,208 (*£133,449*) carried forward. Consolidated current liabilities and provisions amount to £1,134,314 (*£1,117,560*), and current assets are listed at £3,201,612 (*£2,962,231*). The value of the work in hand exceeds £30,000,000, it is stated.

**Dividend Declared**

*Hubert Davies and Co.*—Interim of 7½%, payable on September 30.

*During August the upward trend in share prices generally continued at a steepening rate, and is reflected in the indices which form the basis of the accompanying graph. The "Electrical Times" index for electrical shares rose by 4·4 points during the month to 91·7% of the mean value during 1948. In comparison, the "Financial Times" index for all industrial ordinary shares just reached the 1948 value (i.e., an index number of 100) with a rise that totalled 6·9 points.*



# Commercial Information

## CONTRACTS OPEN

### HOME

**Sept. 6.—Ormskirk U.D.C.** Supply of 63 concrete columns, lamps, lanterns and components for Group A and B street lighting. Surveyor, Council Offices, Burscough St. (See August 14 issue.)

**Sept. 8.—Musselburgh.** Erection of 15 lamp standards and installation of sodium lamps in Pinkie Rd. Burgh Surveyor, Municipal Offices, High Street.

**Sept. 8.—Wymondham U.D.C.** Supply and installation of 21 concrete columns, lanterns, etc., on London-Norwich Rd. and in conversion of street lighting from gas to electric. T. J. Turner, clerk, Council Offices. Deposit £2 2s. (See August 21 issue.)

**Sept. 9.—Dover T.C.** Supply and erection of 11 concrete columns and fixing of H.P.M.V. units and auxiliary equipment and complete wiring along Snargate St. Also supply of 11 sets of lanterns, 40 W H.P.M.V. lamps, gear, time switches, all to Group A standard for same scheme. These are separate contracts. Borough Engineer, Brook House. Deposit £2 2s. in each case. (See August 21 issue.)

**Sept. 10.—Edinburgh.** Electrical installation in 185 houses at Clermiston. City Architect, City Chambers, Edinburgh 1.

**Sept. 11.—Belfast T.C.** Electrical installation at Annadale Grammar School gymnasium, and St. Mark's Primary School, Ligoniel Rd., and additions to electrical installations at Grosvenor High School, Graymount Open-air School, and Donegall Rd. Primary School. Details from the Education architect, 40 Academy St., Belfast.

**Sept. 12.—Edinburgh.** Lighting and power installations in 90 houses and 15 shops on Inch Housing Development. City Architect's Office, City Chambers.

**Sept. 12.—Sheffield T.C.** Electrical installations in 652 dwellings on the Hachenthorpe estate, in 54 dwellings on the Basegreen estate, and in 50 dwellings on the Birley estate. W. G. Davies, City Architect, Town Hall, Sheffield 1. Deposit £1.

**Sept. 12.—Kendal T.C.** Provision and installation of 72 mercury vapour lighting units and 7 fluorescent units, in Group A, including concrete columns and auxiliary equipment and wiring along Windermere Rd. Borough Engineer and Surveyor, Municipal Offices, Lowther Street. (See July 24 issue.)

**Sept. 12.—Sheffield.** Electrical installation in Hurlfield secondary school. W. Geo. Davies, City Architect, Town Hall. Deposit £2.

**Sept. 13.—Consett (Dur.) U.D.C.** Installation of electric lighting in 34 houses at Shotley Bridge. Applications to E. Simpkin, surveyor, Council Offices, Medomsley Rd., by above date.

**Sept. 18.—Durham T.C.** Erection only of 18 street lighting units in North Rd., Durham. The steel columns, lanterns and control gear will be provided by the Council. City Engineer, Town Hall, Durham.

**Sept. 18.—Manchester T.C.** Alterations and additions to electrical installation at Bostock Hall, near Northwick. City Architect, Town Hall, Manchester. Deposit £1 1s. (See August 18 issue.)

**Sept. 19.—Neston U.D.C.** Supply and erection of 32 electric lighting columns, height 25 ft, for fluorescent and sodium lamps, together with all necessary control gear and fuses. Engineer and Surveyor, Town Hall Neston. Deposit £1 1s.

**Sept. 22.—Berwickshire C.C.** Electrical work in 7 houses at Lower Burnmouth. County Surveyor, Duns.

**Sept. 22.—Haverfordwest T.C.** Installation of electric light and power in about 143 houses in scheme No. 2. Borough Surveyor, 9 Victoria Place. Deposit £2.

**Sept. 22.—Nottingham Education Committee.** Stage 1 of the re-wiring of the Nottingham and District Technical College, Shakespeare St., Nottingham, including mains, switchgear and final circuit wiring for complete new lighting and power schemes, including the supply and erection of all lighting fittings. Particulars from consulting engineers, E. G. Phillips, Son and Norfolk, Arskus House, Annesley Grove, Nottingham. Deposit £2. (Advertised in this issue.)

**Sept. 26.—Glendale R.D.C.** Supply of electric cookers for 43 houses. J. Baston, Clerk of the Council, Council Offices, Wooler.

**Sept. 27.—Barry T.C.** Installation of street lighting to Group A standard along 3¼ miles of roads in the borough. Schemes are to be submitted for the complete works of dismantling existing lighting installations, supply and erection of columns and fittings and electrical connections to mains. Borough Engineer and Surveyor, Town Hall, Tynewydd Rd., Barry.

**Oct. 1.—Dalkeith T.C.** Electrical work in 80 houses at Woodburn. Particulars from the surveyors, Morham and Brotchie, 29 Hanover St., Edinburgh.

**Oct. 3.—Portsmouth T.C.** Supply and installation of an electrically operated air conditioning and gas filtration plant at the civil defence main control, Fort Widley. City Engineer, Council Chambers, 1 Clarence Parade, Portsmouth. Deposit £2 2s.

**Oct. 8.—Goole T.C.** Vertical spindle centrifugal pump, 75,000 gal/hr. against static head of 210 ft., with electric motor, for Pollington Waterworks. Silcock and Simpson, consulting engineers, 10 Park Row, Leeds. Deposit £5.

**Oct. 14.—Cork.** Electrical installation at the Southern Regional Sanatorium, Sarsfields Court, Glanmire, now under construction for the Department of Public Health, to house 344 patients. Work comprises 220/380 V installation for lighting, heating, cooking, sterilising, water heating, etc., and low voltage installation 12-100 V for nurses' call systems, telephones, radio and p.a. remote control, clocks, etc., and the supply and fixing of specified equipment, appliances and fittings. P. O. Cinneide, secretary, Department of Public Health, Custom House, Dublin. Deposit £20.

**No date stated.—Bristol.** Electric batteries, lamps and general items included in list of supplies required by Southmead General Hospital. C. C. Hancock, secretary, Group Administrative Offices, Southmead Hospital, Bristol.

**No date stated.—Hendon T.C.** Additional lighting points and electric lighting fittings, and reinstatement of defective wiring installation at Hendon County Grammar School, The Crest, Hendon. Applications to Borough Engineer and Surveyor, Town Hall, Hendon, N.W.4, by Sept. 8. Deposit £2 2s. (See August 28 issue.)

**No date stated.—N. of Scotland H.E. Board.** Supply and erection of approximately 13 miles of 33 kV double-circuit woodpole over headlines in Killin district, Perthshire. Merz and McLellan, 39 Northumberland St., Edinburgh 3. Deposit £2 2s. (See August 7 issue.)

## OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horse Guards Avenue, S.W.1, quoting reference.*

**Sept. 10.—Thailand.** Three arc-welding sets and two engine-driven welding plants for Railways Organisation. B.o.T. (Ref: CRE 28346/52).*

**Sept. 18.—South Africa.** 150,000 glass fuses, tubular, 5 amp, 2½ in. long, and 150,000 ditto 10 amp, to specification Union No. 188B, for Government of the Union of South Africa. B.o.T. (Ref. CRE 29697/52).*

**Sept. 18.—South Africa.** For Union Tender and Supplies Board, 5,000 3-pin plug assemblies, 20,000 3-way sockets and 1,000 4-pin plugs (male portion only). B.o.T. (Ref. CRE 29698/52).*

**Sept. 18.—South Africa.** 210 Thermostatic switches, Nos. 5850755 or 5492799, for Frigidaire, for Government of South Africa. B.o.T. (Ref. CRE 29699/52).*

**Sept. 23.—India.** Supply of dry and inert cells, dry batteries and sac elements, for Director-General, Supplies and Disposals, New Delhi. B.o.T. (Ref. CRE 29745/52).*

**Sept. 23.—Uruguay.** For the first stage of the western circuit of the national power grid for Usinas Electricas y Telefonos del Estado: transformer substations and 110 kV and 33 kV interconnecting transmission lines, including three 25 MVA, one 2 MVA, three 5 MVA and three 1·5 MVA transformers. B.o.T. (Ref. CRE 29513/52).*

**Sept. 24.—Formosa.** Cable for Central Trust of China: 3,500 metres of 3·3 kV 3-core p.i.l.c.s.t.a., 1,500 m of 600 V 3-core p.i.l.c.s.t.a., and 500 m of rubber covered 4-core 14 sq mm. B.o.T. (Ref. CRE 2906/52).*

**Sept. 25.—Peru.** Equipment for hydro-electric station at Cajamarca, including one water turbine, automatic speed regulator, and a 100 kVA, 230 V alternator, and control board. B.o.T. (Ref.: CRE 29965/52).*

**Sept. 25.—Uruguay.** Supply of base copper conductors for Usinas Electricas y Telefonos del Estado: (a) 25,000 kilos wire 16 sq. mm. (b) 2,000 kilos of cable 16 sq. mm. of 19 wires, and (c) 10,000 kilos of cable of 35 sq mm. of 19 wires. B.o.T. (Ref. CRE 28496/52).*

**Sept. 30.—Uruguay.** (*a*) 190,000 white porcelain insulators 90 mm. high by 60 mm. dia.; (*b*) 66,000 iron support pins for above; (*c*) 200,000 porcelain insulators 100 mm. by 70 mm.; (*d*) 67,000 iron support pins; (*e*) 50,000 aerial circuit-breakers, test voltage 1,000 V, 50 cycles. B.o.T. (Ref. CRE 28495/52).*

**Oct. 2. — Syria.** Substation equipment and 13·5 kV transmission line for Damascus Electricity Administration. B.o.T. (Ref. CRE 28863/52).*

**Oct. 2.—South Africa.** 192,000 ft of armoured signalling cable, 8/·036, s.c.; 352 complete train lighting dynamos and control equipment, with spares; and 12 air compressors; for South African Railways. Details from Chief Stores Superintendent, Room 202, Park Chambers, Rissik Street, Johannesburg.

**Oct. 2.—South Africa.** One private automatic exchange for Pretoria, for Union Tender and Supplies Board. B.o.T. (Ref. CRE 29696/52).*

**Oct. 8.—Australia.** (a) Twenty-four 3,450 kVA 6·6 kV automatic induction voltage regulators; (b) six 2,500 kVA 22 kV ditto; (c) eight 5,000 kVA 22 kV ditto; and (d) four 10,000 kVA 22 kV, for State Electricity Commission of Victoria. B.o.T. (Ref. CRE 29716/52).*

**Nov. 14.—Northern Rhodesia.** 11 kV and l.t. cables, switchgear and transformers for Northern Rhodesia Government. Details from consulting engineer, P.O. Box 4648, Johannesburg. Deposit £3 3s.

**Nov. 18.—New Zealand.** 159-220 kV single-circuit galvanised steel transmission line towers for the Bunnythorpe-Haywards 220 kV line, for the State Hydro-Electric Department. Towers will comprise 123 standard suspension, 5 heavy, and 31 angle towers. Specifications and plans seen at N.Z. Government Office in London. Deposit £100.

## *Your Queries — Answered*

**"Aradite" adhesive for metal, porcelain, etc.,** makers of? R.D.—Aero Research, Ltd., Duxford, Cambridge. (23786)

**British Unit Heater and Radiator Co.,** address of? S.B.—This firm is now Copperad Ltd., 12 Baker St., W.1. (23794)

**Burgess Battery Co., Freeport, U.S.A.,** address for replacements? B.B.—Try: Burgess Products Co., Ltd., Hinckley, Leics. (23809)

**"Francis" lamplocks,** suppliers of? M.B.—General Electric Co., Ltd., Magnet House, Kingsway, W.C.2. (23816)

**"Challenge" irons,** makers of? T.E.—Revo Electric Co., Ltd., Tividale, Tipton, Staffs. (23829)

**"Schick" dry shavers,** agents for? Y.B.—Sydney H. Mugford Ltd., 11 Hills Place, Oxford Circus, W.1. (23836)

**"Olympus" candle lamps,** makers of? L.E.—Olympic Lamps, Ltd., 15 Bury St., London E.C.3. (23845)

**"Tireless Tim" vacuum cleaners,** suppliers of? C.M.—Hogan and Wardrop Ltd., 47 Caledonian Rd., N.1. (23855)

*The above are selected from questions we have answered this week. If you have a query, send it to us.*

## CONTRACTS PLACED

**B.E.A.** During the past month, contracts have been placed for equipment ammounting to £6,665,970. The principal contracts include: Woolwich power station, boiler house structural steelwork, Redpath Brown and Co., Ltd.; Brighton "B" power station, two 320 k lb/hr boilers, Babcock and Wilcox, Ltd.; Littlebrook "C" power station, coal handling plant, Fraser and Chalmers Engineering Works; Connah's Quay power station, two 300 k lb/hr boilers, International Combustion Ltd., and 132 kV 2,500 MVA switchgear, Ferguson, Pailin Ltd.; Doncaster power station, auxiliary power, control and alarm cables and connections, Enfield Cables Ltd.; Stella North power station, six boiler feed pumps, G. and J. Weir Ltd.; Stella South power station, boiler feed pumps, Sulzer Bros. (London) Ltd.; and Staythorpe (Newark)-Drakelow, 275 kv twin 0·4 sq in. transmission line, W. T. Henley's Telegraph Works Co. Ltd.

**Carlisle.** Electrical work in engineering services for villas at Dovenby Hall, for Regional Hospital Board, G. Bowman Ltd., £2,976 and J. Corbett Ltd., £6,689 respectively.

**London.** The Alton Battery Co., Ltd., has obtained a contract for replating two 12,470 amp/hr batteries situated in London, which were originally installed by the company in 1926 and form one of the largest telephone battery installations in the country. Other contracts obtained by the firm include batteries from 800 to 5,000 amp/hr capacity for installation in telephone exchanges at Manchester, Portobello, Liverpool, Leeds, Glasgow, Edinburgh and Wrexham. Export orders in hand cover batteries of capacities up to 6,970 amp/hr for shipment to 21 countries.

**Maidstone.** Wirings and fittings for lighting, power, clocks, telephone, etc., at Oakwood Hospital, G. E. Wallis and Sons (Electrical), Ltd., £1,626; and wiring in 44 houses at Shepway estate, L. Taylor, £1,215.

**Stoke-on-Trent.** Lighting along trunk road A.34 from Newcastle to Ash Green: erection of lamps and columns, General Electric Co., Ltd., £8,851; and laying of mains and services, Clough Smith and Co., Ltd., £9,571.

**Stockport T.C.** Electrical work in 34 houses at Nelstrop Road, Ingram and Ashton, £1,614.

**PRICE OF CABLE METALS AND OTHER MATERIALS**
*(at Tuesday night)*

| | £ s. d. | New York price |
|---|---|---|
| COPPER, electrolytic ... ... ... | 285 0 0 | — |
| LEAD, good soft pig (foreign) ... ... | 131 0 0 | £128 0 0 |
| " " "English" quality ... | 132 10 0 | |
| TIN (99-99.76%) ... ... (Cash) | 961-962 | — |
| " (3 months) ... ... ... | 949-950 | — |
| ALUMINIUM, commercial purity (del.) | 157 0 0 | — |
| ZINC ... ... ... ... ... | 122 0 0 | £112 0 0 |
| ARMOURING: | | |
| Galv. Steel Wire (0.104 in.) ... | 54 0 0 | — |
| Mild Steel Tape (0.04 in.) ... ... | 39 15 0 | — |

## GAZETTE ANNOUNCEMENTS

### COMPANIES ACTS

**Arthur Bailhache Ltd.**, electrical contractors, of Central Ave., West Molesey, Surrey. Mr. S. J. Collier, 99 Elgar Ave., Tolworth, Surrey, appointed liquidator on August 20, 1952.

**Charles Amplifiers Ltd.** Meeting of members and creditors at 11-12 Finsbury Sq., E.C.2, on October 2 at 3 p.m., to receive report of Mr. N. Osborne, liquidator, on winding-up.

**Diamond (Battery Efficiency Products) Ltd.** Meetings of members and creditors at Star Chemical Works, Watts Grove, Bromley-by-Bow, E.3, on September 30, at 3 p.m. and 3.30 p.m. respectively, to receive report of Mr. P. Phillips, liquidator, on winding-up.

*Voluntary Liquidation*

**B. and B. Scott Ltd.**, electrical engineers, 61 Windmill Hill, Ruislip, Middx. At a meeting of creditors on August 25, the statement of affairs submitted disclosed unsecured liabilities of £3,211 12s. 4d., and in addition there were preferential creditors for £31 17s. 4d. and a debenture of £1,120 11s. 6d. The assets, after deducting preferential and debenture claims, were estimated to realise £169 11s. 2d. Mr. P. Phillips, accountant, said that in July last he was appointed receiver by the debenture holder, and he had since carried on the business with a view to realising as much as possible. He said that he had not valued the lease of the company premises in Windmill Hill, Ruislip, on the statement of affairs, but he thought that the lease was worth about £500. Following his suggestion the meeting was adjourned until Sept. 22.

### BANKRUPTCY ACTS

*Partnership Dissolved*

**Derby.** Harry Ison Towle and George Frederick Latham, trading as Derby Rewinding Co., electrical and mechanical engineers, at Highfield Works, 61 Kedleston Rd. Dissolved from August 16 so far as concerns G. F. Latham. All matters being dealt with by H. I. Towle who is continuing the business.

*Receiving Orders*

**York.** Wann, William Penman, trading as "Electricity Service," at Grape Lane, and formerly of 41a Petergate. Receiving order dated August 21, 1952.

**Manchester.** Crutchley, Frank Joseph, electrical engineer, 9 York St., Hulme, and formerly of 304 Deansgate, Manchester. Receiving order dated August 27, 1952.

*Appointment of Trustees*

**Middlesbrough.** Milne, John George, radio and electrical dealer, 34 Whitworth Rd., Grangetown. Trustee, C. G. Sparrow, 62-63 High St., Stockton-on-Tees.

**Great Grimsby.** Rudd, Kenneth Gordon, radio and electrical contractor, 4 Commercial Rd., Louth, and formerly of 52 Eastgate, Louth. Trustee, L. F. McCulloch, 26 South St. Mary's Gate.

*Dividend*

**Warwick.** Bateman, Dennis Noon, radio and electrical engineer, trading as Villiers Electric, at 1 North Villiers St., Leamington Spa. Supplemental dividend of 8½d. in £, payable on September 20 at office of official receiver, Somerset House, 37 Temple St., Birmingham.

*Order Annulled*

**Stourbridge.** Thornton, Robert Thomas, trading as Lustre Products, electric switch block manufacturers, Bedcote Works, Birmingham St. Receiving order dated May 8, 1952, rescinded, following payment in full of debts and costs.

# BUSINESS PROSPECTS

## HOME

**Ashton - in - Makerfield.** The U.D.C. has prepared a scheme for the construction of swimming baths at the southern end of the market ground. Estimated cost £55,000.

**Barnstaple T.C.** recommended to prepare bills of quantities for the erection of shops at Forches estate.

**Belfast T.C.** Erection of 19 houses at Newcastle Street and 30 flats at Dundela Avenue. Housing architect's department, 94 Chichester Street.

**Boldon (Co. Durham).** J. Potts and Son, architects, John Street, Sunderland, have submitted plans to the U.D.C. showing the proposed development of land south of East Fields, Whitburn.

**Bradford T.C.** Erection of a new infants and junior school (560 scholars) adjoining New Line, Greengates. City architect, Town Hall.

**Bromley T.C. (Kent).** Erection of 64 houses and 10 old people's dwellings at Blackbrook estate. Borough engineer, Municipal Offices.

**Carlisle.** The architect for the proposed public house at Harraby for the State Management Scheme is J. W. Williamson, F.R.I.B.A., chief architect, Home Office, London. The contractor has not yet been decided.

**Carmarthenshire.** C.C. to apply for consent to borrow £172,972 for the erection of a technical college at Ammanford, and £2,390 for improvements to Llandilo Voluntary School.

**Carnforth U.D.C.** Construction of 10 houses at Highfield-Kellet. Road, architects: Middleton and Jones, Queen Street, Lancaster.

**Dundee.** The Town Planning Committee has approved the erection of a factory for the Eldorado Ice Cream Co., Ltd.

**Enfield.** The U.D.C. has approved plans for extension to factory at corner of Lincoln Road and Great Cambridge Road, for Chamberlain Industries, Ltd.

**Eston (Yorks.)** Newcastle-on-Tyne Regional Hospital Board, "Dunira," Osborne Road, Newcastle-on-Tyne are planning additions to hospital in Flatts Lane, Normanby. The Regional Licensing Officer has asked the U.D.C. for its views regarding the issuing of a building licence for alterations to the Cleveland Inn, Normanby, and the Council has replied in favour of work commencing on a modified scheme only. The architects are Kitching and Co., 21 Albert Road, Middlesbrough. A licence amounting to £47,000 is being issued to Smith's Dock Co., Ltd., South Bank, for additions to joiners' shop and frame shed, provision of road to frame shed and main drain to the river at the company's shipyard.

**Glasgow T.C.** Erection of 28 flats at Blyth Place and 16 at Kerrera Place, Barlanark, and 16 at Liddesdale Terrace, Milton. Director of Housing, 20 Trongate, Glasgow.

**Hartlepool.** The T.C. is to erect about 90 houses on Nicholson's Field.

**Harwich T.C.** Erection of 14 flats at Pound Farm estate. Borough architect, Town Hall.

**Hayes and Harlington U.D.C.** Erection of 76 dwellings at Barnhill Estate and 8 maisonettes and six shops at Charville Lane estate. Engineer and surveyor, Town Hall, Hayes, Middx.

**Hornchurch U.D.C.** Erection of 24 flats at Easedale Drive, Elm Park. Surveyor, Council Offices, Billet Lane.

**Isle of Wight R.D.C.** Erection of 84 houses at four sites. Architects, E. L. Smith & Son, Melville Chambers, High Street, Sandown, I.O.W.

**Keighley T.C.** Erection of 26 houses at Thwaites Brow Road. E. G. Felgate, borough architect, College Street.

**Liverpool T.C.** Erection of 10 houses at Newburn Street, Walton, 8 at Tetlow Street and Walton Lane, 4 at Perth Street and Dunkeld Street and 2 at Bodmin Road, Walton. City architect and director of housing, Blackburn Chambers, Dale St., Kingsway, Liverpool.

**Llandudno U.D.C.** Erection of 14 houses at Tre Creuddyn estate. Engineer and surveyor, Town Hall.

**Morpeth.** The Northern (N. and C.) Coal Board have submitted plans to the R.D.C. for developments at Ulgham including new drift mine, offices, baths, canteen, and railway connections at Ulgham, together with a proposed mineral railway from Longhirst to Linton. Plans are by the N.C.B. Area Chief Surveyor, Ashington, Northumberland.

**New Mills U.D.C.** Erection of 48 houses at Highfield estate. Surveyor, Town Hall, New Mills, near Stockport.

**Norwich T.C.** Erection of 22 dwellings at Cooper Lane estate. City architect, City Hall.

**Renfrew.** Ministry of Civil Aviation has approved plans for an airport terminal. Estimated cost £150,000.

**Romford T.C.** Erection of 22 houses at Crowlands Avenue, and 10 at Barton Avenue. Quantity surveyors, A. S. Wilson and Partners, 8 Storey's Gate, Westminster, S.W.1.

**Shoreham-by-Sea U.D.C.** Erection of 32 houses at Hammy Lane. Architect, R. Browne, 4 East Street.

**Spalding.** U.D.C. have submitted to Ministry of Housing for approval plans for 22 old people's bungalows in Stonegate. Plans by Council's Architect, Spalding.

**St. Austell R.D.C.** Erection of 40 houses at Creakarose, St. Stephen, 8 at Coombe, St. Stephen and 4 at Carloggas, St. Mawgan. Engineer and surveyor, "Trevarna," 12 Carlyon Road, St. Austell.

**Swale R.D.C.** Erection of 14 houses at Stockers Hill Road, Rodmersham. Engineer and surveyor, 48 Bell Road, Sittingbourne.

**Wakefield U.D.C.** Erection of 14 bungalows and 18 houses at five sites. Engineer and Surveyor, Council Offices, 18 St. John's North, Wakefield.

**Warminster U.D.C.** Erection of 36 houses at Alcock Crest. Architects, Snailum, Huggins and Le Fevre, 18 Brock Street, Bath.

**Watford R.D.C.** Erection of 32 houses at Anthony Close, Green Lane, Oxhey. Architects, Dawe, Carter and Partners, 83 High Street, Watford.

## OVERSEAS

**Egypt.** The Continental Distributing Co. of Cairo is interested in representing a U.K. manufacturer of battery-operated radio sets, and also in obtaining an agency for dry batteries for torches and radios. B.o.T. (Ref. CRE 28199/52).

## TRADE NOTES

**New Phone No.** As from September 15, the telephone number of the head office of the Association of Supervising Electrical Engineers will be Barnet 9141.

**Change of Address.** The Edison Swan Electric Co.'s store at Taunton has now been transferred to Priory Bridge Rd. The telephone remains Taunton 3267 and the store will continue to be controlled from the company's Bristol office.

**Amalgamation.** Although indirectly associated for a long time, it has now been decided to amalgamate John Bowen Fittings Ltd. with Payne and Penny Ltd. All production will be embodied in one factory at Chelsea, and Mr. E. C. Harvey will control the administration of both companies from offices at 556 Kings Rd., Chelsea, S.W.6, to where all correspondence should be addressed. Mr. J. H. Bowen will continue to direct sales, both home and export and Government contracts.

**Battery Duty.** Following the report of the Tariff Commission, the Government of India has agreed that protection of the local motor vehicle battery industry should be continued up to the end of 1955, but the standard rate of protective duty is reduced to 42½% (instead of 80%) for such batteries and plates of British manufacture, and 45½% (previously 83%) if not made in Britain.

**Ceylon's Restrictions.** Among goods which the Ceylon Government has now restricted under open general licence from hard currency areas are refrigerators and wireless apparatus.

## TRADE MARKS

*This information is extracted from the Official Journal by permission of the Controller.*

**Advance.** 696,927. Class 9. Electric resistance metals in the form of wire, rod, strip or sheet. British Driver-Harris Co. Ltd., Gaythorn Mills, Albion St., Manchester 15.

**Bush.** 698,627. Class 9. Wireless receiving sets, etc. Bush Radio, Ltd., Albion House, 59 New Oxford St., W.C.1.

**Bivac.** 700,427. Class 9. Electric vacuum cleaning apparatus for industrial purposes. Bivac Air Co., Ltd., Beehive Mill, Marsland St., Portwood, Stockport.

## NEW COMPANIES

*Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2*

**T. A. Berry (Lodge Radio) Ltd.,** 6/7 Castle Parade, Ewell By Pass, Ewell, Surrey. Cap.: £1,500. Dirs.: to be appointed by subs. Subs.: T. A. Berry and Pauline E. Berry, 57 Kew Cres., North Cheam, Surrey.

**Columbia Plating Co. Ltd.,** 216 Columbia Rd., E.2. To carry on business of electro plating in all metal finishes, etc. Cap.: £100. Dirs.: C. A. Lansdorff and T. A. B. Brown.

**F. W. Hopwood (Developments) Ltd.** Electronic and electrical designers and manufacturers, etc. Cap.: £5,000. Gov. dir. and chrmn.: F. W. W. Hopwood, 5 Humber Rd., Beeston, Notts. Sub.: G. J. MacKay, 44 Burnside Rd., West Bridgford, Notts (coy. acct).

**W. J. Illsley Ltd.,** Smiths Bank Chambers, Market Place, Derby. Dealers in and repairers and hirers of electrical and mechanical apparatus and accessories, in particular wireless sets, etc. Cap.: £1,000. Dirs.: Lilian Illsley and A. H. Evans.

**Keeler Instrument Developments Ltd.,** 1 Tilney St., W.1. To carry out research and other scientific work in connection with the manufacture of scientific, industrial and medical instruments. Cap. £200. Dirs.: not named. Subs.: B. J. A. Bard and E. Jones, 1 Tilney St., W.1.

**Ladbroke Rewind Service Ltd.,** 820A Harrow Rd., Kensal Green, N.W.10. Elec. equipment specialists, etc. Cap.: £100. Dirs.: G. F. Wright, G. W. L. Devine and L. A. Clilverd.

**Oprim Sales Ltd.,** 25 Park Way, Edgware, Middlesex. General, mechanical, electrical, radio and motor engineers, etc. Cap.: £1,000. Dirs.: E. G. Opperman, R. Machin and J. C. Opperman.

**Trusound Ltd.,** 196 Kingsley Rd., Hounslow, Middlesex. Manufacturers of and dealers in magnetic tape recording and sound reproducing and amplifiers, etc. Cap.: £1,000. Dirs.: E. P. Harris, W. Fischer and W. G. Lee.

**Taylor-Tutin Ltd.,** Algeria House, Bury St., E.C.3. Manufacturing, designing, importing, exporting and dealing in domestic and other articles and appliances, etc. Cap.: £100. Dirs.: J. L. Taylor, E. L. Bols, J. Tutin, P. M. Tarsh and J. W. Martin.

**Transmission Co. (New Moston) Ltd.,** 45 North Crescent, New Moston, Manchester 10. Manufacturers of and dealers in clutches for sewing machines and engineering plant, etc. Cap.: £1,000. Dir.: R. Dickinson and Joyce Dickinson.

## MEETINGS TO NOTE

### THURSDAY, SEPT. 4

A.S.E.E. (S. London branch).—"Oil Burners and Panel Heating." E. H. Bailey. Cafe Royal, North End, Croydon, 8 p.m.

### FRIDAY, SEPT. 5

A.S.E.E. (Crewe branch).—"Ethical Implications of Science," J. Levitt. Crewe Arms Hotel, 7.30 p.m.

A.S.E.E. (Liverpool branch).—Chairman's address, L. Harper. Liverpool Engineering Society, 9 The Temple, Dale Street, Liverpool, 7.30 p.m.

### THURSDAY, SEPT. 11

INCORP. PLANT ENGRS. (Newcastle Branch).—"Liquid Fuel Firing." Alan Moore. Roadway House, Oxford St., 7.30 p.m.

### FRIDAY, SEPT. 12

ELECTRICAL TRADES COMMERCIAL TRAVELLERS ASSCN.—General meeting, 5.45 p.m., followed by "Question Forum," at 7 p.m. Feathers Hotel, Broadway, S.W.1.

### MONDAY, SEPT. 15

BIRMINGHAM ELECTRIC CLUB.—Extraordinary general meeting. Midland Hotel, New St., 6.15 p.m.

INCORP. PLANT ENGRS. (Liverpool and N. Wales Branch).—"Amenities in Industry." H. S. Crump, Radiant House, Bold St., 7.15 p.m.

### TUESDAY, SEPT. 16

INCORP. PLANT ENGRS. (Glasgow Branch). — "Mechanical Handling Equipment and Methods." F. T. Dean. Engineering Centre, Sauchiehall St., 7 p.m.

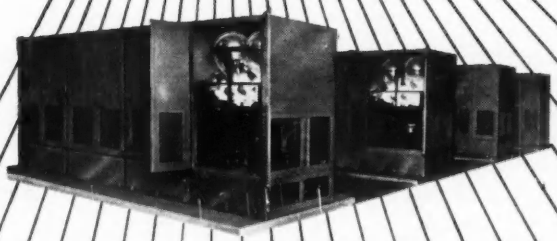
A.P.L.E.—Annual conference and exhibition at Harrogate. Closes on Sept. 20.

INCORP. PLANT ENGRS. (St. Albans Branch).—Discussion on "Radio and TV Interference." C. E. Hollingworth. Peahen Hotel, 7.30 p.m.

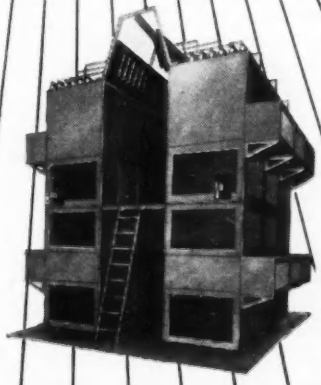
### WEDNESDAY, SEPT. 17

MACHINE TOOL EXHIBITION at Olympia, London. Closes on Oct. 4.

**Made in Britain for service throughout the World.**



*Hewittic Rectifiers in traction service in Canada (British Columbia Electric Co.). Each bank has a capacity of 1,500 kW. with high overload rating for heavy traction service. The total capacity of Hewittic Rectifiers on this system is approximately 30,000 kW.*



*Hewittic 1,800 kW. Rectifier. One of a number totalling 15,000 kW., supplying the Buenos Aires Western Railway.*

*Hewittic Rectifiers in service in India. One of a large number of equipments totalling over 20,000 kW. for D.C. light and power—output 1,700 kW. three wire under tropical conditions.*

**HEWITTIC rectifiers**

**over 1¼ Million kW. in World-wide service**

HACKBRIDGE AND HEWITTIC ELECTRIC CO., LIMITED
WALTON-ON-THAMES - SURREY - ENGLAND
*Telephone : Walton-on-Thames 760 (8 lines)* *Telegrams : "Electric, Walton-on-Thames"*

*"A job to be proud of!"*

**What satisfaction in a job well done. It is *inevitable* with Metallic quality and consistent accuracy.**

Screwed and Socketed Conduit Thread.

Sunk-type Switch Iron Cover.

Sunk-type Plug Fitting Iron Cover.

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*It always pays to SPECIFY* METALLIC

# CONDUIT TUBE & FITTINGS

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**THE METALLIC SEAMLESS TUBE Co. Ltd., Ludgate Hill, BIRMINGHAM 3. Tel. CEN 7167**

**Also at London, Newcastle-on-Tyne, Leeds, Swansea and Glasgow**

# CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED • FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 2/- per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

## TENDERS INVITED

### NOTTINGHAM AND DISTRICT TECHNICAL COLLEGE JOINT EDUCATION COMMITTEE

THE JOINT EDUCATION COMMITTFE invite tenders for Stage 1 of the RE-WIRING of the Nottingham and District Technical College, Shakespeare Street, Nottingham. This is the first stage of a three-year programme and includes mains, switchgear and final circuit wiring for complete new lighting and power schemes including supply and erection of all lighting fittings.

Specifications and Drawings may be obtained from the Consulting Engineers, Messrs. E. G. Phillips, Son, and Norfolk, Arskus House, Annesley Grove, Nottingham, on payment of a deposit of £2, which will be returned upon receipt of a bona-fide tender.

Tenders in the official envelope supplied are to be delivered to me not later than 5 p.m. on Monday, O tober 20, 1952.

The lowest or any tender will not necessarily be accepted, and tenders will only be considered from firms paying the standard rates of wages, etc., and who conform to the working rules of the Nottingham District.

F. STEPHENSON,
Clerk to the Joint Education Committee.

Education Office,
South Parade, Nottingham. (B 1)

## APPOINTMENTS VACANT

*Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.*

### SOUTH EAST SCOTLAND ELECTRICITY BOARD

*Edinburgh Sub-Area*

Commercial Department

APPLICATIONS are invited for the following appointments:—

SENIOR ASSISTANT ENGINEER—to assist the Sub-Area Commercial Officer and in particular, to negotiate with industrial and large commercial consumers. Preference will be given to fully qualified engineers who have had wide experience in developing the use of electricity.

Salary in accordance with the N.J.B. Agreement, Grade 4, Class "H" (£939 to £979).

SECOND ASSISTANT ENGINEER—to assist in the operation of service centres, installation contracting, and appliance maintenance service, including repairs workshop. Preference will be given to fully qualified engineers who have had experience in the control of sales and service activities and electrical contracting.

Salary in accordance with the N.J.B. Agreement, Grade 7, Class "H" (£747 to £778).

Applications, stating age, details of education, qualifications and experience, should be addressed to the undersigned to arrive not later than Monday, September 15, 1952.

G. T. ALLCOCK,
Sub-Area Manager.

Dewar Place,
Edinburgh 3. (B 2)

### BRITISH ELECTRICITY AUTHORITY

*Midlands Division*

FIRST ASSISTANT STATION CHEMISTS are required at Hams Hall "B," Nechells "B," Worcester and Ironbridge Generating Stations. N.J.B. Service conditions, superannuable appointments, salaries in accordance with Schedule "A," Grade 9, as follows:

| | |
|---|---|
| Hams Hall "B," | Class "K," £741-£771. |
| Nechells "B," | Class "J," £699-£728. |
| Worcester, | Class "E," £567-£579. |
| Ironbridge, | Class "H," £660-£685. |

Applicants should preferably hold a university degree or A.R.I.C. but consideration will be given to candidates holding Higher National Certificate and studying for A.R.I.C. or equivalent qualifications. They should have had a thorough knowledge and practical experience of fuel, water and oil analyses, coal sampling and water treatment and other chemical services required in modern power stations.

Application forms available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham, 13, to be completed and returned not later than September 20, 1952.

F. W. LAWTON,
Divisional Controller.
(B 16)

### SOUTH WALES ELECTRICITY BOARD

REQUIRED, DISTRICT COMMERCIAL MANAGER, in District 102 (Fishguard) in the Western Sub-Area of the Board.

Salary in accordance with Class "A," Grade 3 (£628 to £654 to £680) of the N.J.B. Schedule.

Applications stating age, present position and salary, qualifications and experience, and giving three referees, to be addressed to the Secretary to arrive by September 13, 1952.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (B 28)

### NATIONAL COAL BOARD

*North-Eastern Division*

APPLICATIONS are invited for the following posts in the Architect's Department at Denaby Main, nr. Doncaster.

1. ELECTRICAL ENGINEERING ASSISTANT

Candidates should hold the Higher National Certificate for electrical engineering or equal qualification, and be able to prepare lay-outs, specifications and approximate estimates for lighting and power circuits, switchgear and transformers for industrial buildings, and should be competent to supervise electrical contracts for such work.

Salary, with a minimum of £525 per annum, will be in accordance with qualifications and experience.

2. HEATING AND VENTILATING ASSISTANT

Candidates should have passed the intermediate examination of the Institute of Heating and Ventilating Engineers, or equivalent, or be studying for such examination, and should have had not less than three years previous experience as a heating and ventilating engineering assistant and draughtsman. Applicants should have drawing office experience in the preparation of lay-outs and schedules for the installation of heating, hot water, ventilation and mechanical plant in buildings.

Salary, with a minimum of £440 per annum, will be in accordance with qualifications and experience.

The work of the department covers pithead baths, canteens, medical centres, workshops, offices, laboratories, etc.

Applications for the above appointments should be made to: Mr. S. W. Squire, National Coal Board, Architect's Department, The Mining Offices, Denaby Main, nr. Doncaster. (B 33)

## BRITISH ELECTRICITY AUTHORITY

*London Division*

APPLICATIONS are invited for the following superannuable posts. Salary, including London Allowance, and conditions of service in accordance with N.J.B. Agreement.

SECOND ASSISTANT ENGINEER
Technical Department, Divisional H.Q.

The successful applicant will be required to take complete charge of the work in the Development Section of the Technical Department.

Candidates should have Degree or Higher National Certificate and an aptitude carrying out system development investigations on own initiative. Some previous experience in this class of work an advantage.

Candidates must have good working knowledge of symmetrical components and methods used for calculating load flows on complex a.c. networks.

Salary: Schedule "C," Class "AX/EX," Grade 2—£849 9s. to £1,108 p.a.

MAINTENANCE ENGINEER (MECHANICAL)
Barking Generating Station

Applicants must have had considerable experience with mechanical maintenance and overhauls of large turbo-alternators, p.f. and chain grate boilers, auxiliary plant, and control of machine shops.

They should also have had wide experience in control of labour of all grades, and they will be responsible for efficient planning and completion of plant overhauls.

Salary: Schedule "A," Class "M," Grade 7—£1,009 1s. p.a.

MAINTENANCE ENGINEER (ELECTRICAL)
Fulham Generating Station

Qualifications: sound electrical training, preferably B.Sc., with an appreciation of mechanical engineering. First class electrical background essential. Wide experience necessary in maintenance of e.h.t. and l.t. switchgear, motors, alternators and all electrical and auxiliary plant, appertaining to large modern power station. Ability to plan, organise and execute work to a strict time schedule in accordance with modern concepts of management essential.

Salary: Schedule "A," Class "L," Grade 7—£946 1s. p.a.

MAINTENANCE ENGINEER (MECHANICAL)
Brunswick Wharf Generating Station

Qualifications: wide experience in maintenance of modern generating plant necessary. Duties will include organisation and planning of overhauls of turbines and boiler plant, keeping records relating to plant history and programming the obtaining of stores to cover such overhaul periods.

Salary: Schedule "A," Class "H," Grade 6—£848 8s. p.a.

JUNIOR ENGINEER (SHIFT) (CONTROL ROOM)
Barking Generating Station

Candidates should have received a sound engineering training with subsequent experience in a generating station and preferably have gained National or Higher National Certificate in electrical engineering.

Salary: Schedule "A," Class "M," Grade 17—£536 11s. p.a.

ASSISTANT ENGINEER (ELECTRICAL TEST)
Bankside Generating Stations

Candidates should have a good knowledge of protective gear, testing, commissioning of new plant, motors, motor starters, etc., Higher National Standard essential.

Salary: Schedule "A," Class "H," Grade 13—£528 3s. p.a.

Applications for the foregoing, stating age, qualifications and experience, to Divisional Secretary, B.E.A., London Division, Ergon House, Horseferry Road, S.W.1, within 14 days of this advertisement. (B 35)

## CROWN AGENTS FOR THE COLONIES

ELECTRICAL ENGINEER required for the Central Electrification Scheme in Cyprus, for two tours each of two years with prospect of permanency. Salary according to qualifications and experience in the scale £960 rising to £1,200 a year. Cost of living allowance at present 10% of salary. Free quarters and passages. Liberal leave with full salary. Candidates must have had considerable experience in the maintenance and operation of a modern generating station; the erection and maintenance of high and low voltage overhead and underground a.c. distribution systems and sub-station plant; and administrative duties associated with a public electricity supply undertaking. Preference will be given to candidates who are corporate members of the Institution of Electrical Engineers or hold equivalent qualifications.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter M.29024B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (B 29)

## BRITISH ELECTRICITY AUTHORITY

*East Midlands Division*

APPLICATIONS are invited for the following appointments:—

Vacancy No. 79/52
STATION CHEMIST
North Wilford Power Station, Nottingham

Applicants should preferably hold the B.Sc. degree in Chemistry, or be Associates of the Royal Institute of Chemistry and must have had considerable experience in the chemical and physical testing of coal, oil and water and in the application of the results of such tests to power station operation.

The salary will be in accordance with Class "K," Grade 7 (£844 to £881 per annum) of the N.J.B. Agreement.

Vacancy No. 83/52
MALE ASSISTANT
Purchasing Department, Divisional H.Q.

The successful applicant will be responsible for obtaining supplies of stationery, office furniture, cleaning materials and general stores. Actual experience in buying is essential, and knowledge of the order progressing and records systems applicable to a large undertaking is desirable.

The salary for this appointment will be in accordance with Grade 2 (£440 to £500 per annum) of the N.J.C. Agreement.

The closing date for these appointments is September 15, 1952.

The above posts will be pensionable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Application forms may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned to the undersigned. Please quote Vacancy Number.

L. F. JEFFREY,
Divisional Controller.
August 29, 1952. (B 39)

## MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEER required in the No. 4/5 Sub-Area, based on Sub-Area Headquarters, Electricity House, Rhostyllen, near Wrexham, North Wales. Salary £532-£553 p.a. (N.J.B. J/13.)

The main duties concern survey work for rural development. Experience in the lay-out and construction of h.v. and m.v. overhead lines necessary, particularly in the survey and profiling of routes. Possession of the Higher National Certificate in electrical engineering and ability to speak Welsh advantageous.

The appointment is superannuable and subject to medical examination.

Application forms obtainable from the Manager (Ref. 48A), above address. Closing date, September 15, 1952. (B 32)

## BRITISH ELECTRICITY AUTHORITY

*Midlands Division*

JUNIOR ENGINEER required at Hams Hall "B" Generating Station, near Birmingham. N.J.B. Service conditions, superannuable appointment, salary within Schedule "A," Class "K," Grade 15, commencing at £505.

Applicants should preferably have had experience in a large generating station and should possess the ordinary National Certificate in mechanical or electrical engineering or an equivalent qualification.

Application forms available from the Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned by September 15, 1952.

F. W. LAWTON,
Divisional Controller.
(B 40)

## NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

*North Caledonia Area*

ASSISTANT DISTRICT ENGINFER required for Peterhead and District, Aberdeenshire. Salary and conditions of service in accordance with N.J.B. F/9 or 11, depending on experience and qualifications. Superannuation scheme applicable. House available. Applications, giving full particulars of education, training and experience, to the Area Manager, West Villa, South Street, Elgin. (B 28)

## BRITISH ELECTRICITY AUTHORITY

*North Western Division*

VACANCY NO. 781—STATION SHIFT CONTROL ENGINEER, Radcliffe Generating Station, nr. Manchester. Salary £557 to £578 (N.J.B. F.10).

Apply to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before September 13. Quote vacancy Number. (B 3)

## SOUTH WEST SCOTLAND ELECTRICITY BOARD

*Ayrshire Sub-Area*

Ardrossan District

APPOINTMENT OF SECOND ASSISTANT DISTRICT ENGINEER

APPLICATIONS are invited for the position of Second Assistant District Engineer in the Ardrossan District.

Salary and conditions in accordance with the National Joint Board agreement, Grade 7, Class "E," £629-£660 per annum, subject to statutory deductions in respect of income tax and superannuation.

A four-roomed bungalow can be provided to the successful candidate, if married.

Applicants should preferably hold a Higher National Certificate in engineering or equivalent qualifications, and have experience in the operation and maintenance of l.v. and h.v. overhead lines, underground mains and substations.

Applications, stating age, whether married or single, and giving full details of education, training, experience and present position to be sent to the Manager, The South West Scotland Electricity Board, Greenholm Street, Kilmarnock, witnin 14 days of the appearance of this notice.

R. RUSSELL BROWN,
Secretary.

Greenholm Street,
Kilmarnock.
August 27, 1952. (B 18)

## UNIVERSITY OF CAPE TOWN

*South Africa*

APPLICATIONS are invited for a II grade TECHNICAL ASSISTANT in the Department of Electrical Engineering (specialisation in scientific and electronic instrument repair would be a recommendation). The salary scale is £350 by £25 to £500 per annum plus a temporary cost of living allowance (at present £280 to £320 per annum for a married man according to notch on salary scale; and £144 per annum for an unmarried man).

Applications (with copies of testimonials) should state age, experience and qualifications, and give the names of two referees whom the University may consult. Two copies of the application and testimonials should reach the Secretary, Association of Universities of the British Commonwealth, 5 Gordon Square, London, W.C.1 (from whom a memorandum giving the general conditions of appointment should be obtained) not later than October 15, 1952. An additional copy should be sent DIRECT BY AIR MAIL to the Registrar, University of Cape Town, Private Bag, Rondebosch, Cape Town, South Africa. (B 41)

## SOUTH WALES ELECTRICITY BOARD

REQUIRED, an ASSISTANT CIVIL ENGINEER responsible to the Board's Civil Engineer.

The successful candidate will be attached to the West Central Sub-Area of the Board (Fforestfach), and will be responsible for all civil engineering work in that Sub-Area together with the Western Sub-Area.

The work will include the carrying out of contracts both by direct labour and outside contractors, preparation of estimates and specifications, reports and advice on land and property for sub-stations, offices and showrooms, and supervision of the preparation of working drawings.

Salary in accordance with "AX/CX" Grade 5 (£629 to £810) of the N.J.B. Schedule.

Applications stating age, present position and salary, qualifications and experience, and giving three referees, to be addressed to the Secretary to arrive by September 13, 1952.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (B 36)

## SOUTH WALES ELECTRICITY BOARD

REQUIRED, ENGINEERING DRAUGHTSMAN (ELECTRICAL), in the Chief Engineer's Department, St. Mellons.

Candidates should have had experience in a manufacturers works and should be familiar with the preparation of finished drawings for switchgear and sub-station layouts and with the layout of protection schemes.

The salary will be in accordance with Class "D," Grade 5 (£547 to £651) of the N.J.B. Schedule.

Applications stating age, present position and salary, qualifications and experience, and giving three referees, to be addressed to the Secretary to arrive by September 13, 1952.

D. G. DODDS,
Secretary.

St. Mellons,
Cardiff. (B 37)

## YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:

*No. 1 (Bradford) Sub-Area*

THIRD ASSISTANT DISTRICT ENGINEER
(Bradford District) (Vacancy No. 85/52)

Applicants should have passed the graduateship examination of the Institution of Electrical Engineers or hold recognised equivalent technical qualifications, have substantial experience in construction, operation and maintenance of high voltage systems, underground cables and overhead lines and sub-stations, and medium and low voltage networks including direct current systems.

Candidates should be prepared to reside in the district and undertake standby duties if required.

Salary, N.J.B., Grade 9, Class "H," £660-£685 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Road, Bradford, not later than September 18, 1952.

*No. 4 (Leeds) Sub-Area*

GENERAL ASSISTANT ENGINEER
(Distribution Design) (Vacancy No. 92/52)

Applicants should hold at least the Higher National Certificate in electrical engineering or equivalent qualification and have had construction or operation experience on overhead and underground distribution systems up to 33 kV.

Experience in planning and estimating will be an advantage.

Salary, N.J.B., Class "K," Grade 13, £563-£585 per annum.

Applications, stating the above vacancy number and giving full details of age, qualifications and experience should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, Nr. Leeds, not later than September 18, 1952. (B 17)

## EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments in the Chilterns Sub-Area:

*Bedford District*

THIRD ASSISTANT ENGINEER. 22/52.R.

Candidates should have had a sound training in electrical engineering and experience of the construction, operation and maintenance of l.v. and h.v. underground and overhead systems including sub-stations.

*Bedford and Watford Districts*

ASSISTANT COMMERCIAL ENGINEERS
(Industrial Power). 36/52.R.

Candidates for both posts must have experience of tariffs associated with industrial and commercial consumers and must be able to advise on and estimate for installations, in such consumers' premises, including power factor correction. A knowledge of street lighting would be a particular advantage. Preference will be given to those holding the Higher National Certificate in electrical engineering.

The salary for all three positions will be in accordance with Class "F," Grade 9 of the National Joint Board Salary Agreement, commencing at £587 p.a. Both future salaries and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications by letter, stating age, education, qualifications and experience, with details of present appointment and salary, should be submitted to the District Manager concerned within fourteen days of the appearance of this advertisement.

Addresses of District Managers are as follows:—

District Manager—Bedford, Eastern Electricity Board, Prebend Street, Bedford.

District Manager—Watford, Eastern Electricity Board, The Parade, High Street, Watford. (B 34)

## BRITISH ELECTRICITY AUTHORITY

*South-Eastern Division*

BRIGHTON "A" POWER STATION. ASSISTANT MAINTENANCE ENGINEER (Electrical). Higher National Certificate preferred. Experience required in the maintenance of alternators, e.h.t. switchgear and motors and all electrical and auxiliary plant. Class "H," Grade 9, £660 per annum. N.J.B. conditions of service and salary. Applications on forms obtainable from Station Superintendent, Brighton Power Station, Portslade-by-Sea, Sussex, to be received by him not later than September 15, 1952. (B 31)

## MIDLANDS ELECTRICITY BOARD

THIRD ASSISTANT DISTRICT ENGINEER required in the Leek District of the North Staffs Sub-Area. Experience required in all branches of distribution work and in the operation, installation and maintenance of h.v. switchgear. Technical qualifications desirable. Salary £567-£678 per annum. (N.J.B., Class "E," Grade 9.)

Applications, stating age, present position, salary and experience, should be forwarded within seven days to Mr. H. A. P. Caddell, Manager, North Staffs. Sub-Area, Midlands Electricity Board, 31 Kingsway, Stoke-on-Trent.

A. STEPHENS,
Secretary.
(B 30)

## SOUTH EASTERN ELECTRICITY BOARD

CHARGEHAND FITTER (ELECTRICAL)
Central Sussex District

WAGES 3s. 6½d. per hour for a 5-day, 44-hour week under N.J.I.C. Agreement. Applicants must be skilled in the erection and maintenance of switchgear, transformers and substation equipment. 33 kV experience an advantage. Accommodation may be available.

Applications, giving two referees, must reach A. Barnes, M.I.E.E., Central Sussex Manager, Electra House, Church Road, Haywards Heath, through an Employment Exchange by September 19, 1952.

A. L. BURNELL,
Secretary.
(B 51)

A FULLY SKILLED ARMATURE WINDER for repair shop. Top rate, bonus, 5-day week, and all holidays paid, etc.—The Lewis Electric Company, Moor Works, Blackamoor Lane, Maidenhead. (A 703)

AN ELECTRICAL DESIGNER, having several years drawing office experience and extensive practical knowledge of l.v. switchgear, small machines and wiring, is needed on a range of attractive projects for feeding the drawing office with design information and clearing production problems. H.N.C. an advantage.—Please write, giving full details and quoting 1017, to Central Personnel Services, English Electric Co. Ltd., 24-30 Gillingham Street, London S.W.1. (B 24)

APPLICATIONS are invited for the following three appointments: DESIGNER DRAUGHTSMAN for automatic control gear and L.V. switchgear. Knowledge of flameproof gear an advantage. Higher National Certificate essential. DRAUGHTSMAN, junior, with experience in industrial switch and control gear. Preferably with National Certificate. JUNIOR CONTRACT ENGINEER with switch or control gear experience and National Certificated. Good working conditions, pension scheme, assistance with housing to married men after a probationary period.—Write stating age, experience, qualifications and salary required. Wallacetown Engineering Co., Ltd., Ayr, Scotland. (B 6)

ASSISTANT ELECTRIC CONTROL GEAR ENGINEER required with some experience of rheostat design. Duties will include preliminary engineering and pricing of schemes for comprehensive rolling mill drives. Drawing office experience desirable. This is a progressive position, located at Stafford.—Please write, stating age, training and experience, and quoting reference 336A, to Central Personnel Services, English Electric Co. Ltd., 24-30 Gillingham Street, London, S.W.1. (B 42)

CAPABLE POWER STATION MAINTENANCE ENGINEER required for service in British West Indies, age 35 to 40. Must have first-class knowledge of diesel electric maintenance, operation and testing. Candidates would be expected to carry out complete overhauls to various types of diesel electric generating plants. The present capacity of the station is approximately 5,000 kW, but additions are being made thereto. Candidates should be of good personality, be socially acceptable and, if married, this qualification applies to wives also. A knowledge of high and low tension electrical equipment is essential and candidates should be able to control and instruct local maintenance and operating staff. Salary (including bonus) £960 per annum, plus furnished quarters. Passages paid.—Applications, giving full particulars of education, training and experience, to Box No. 1983, Electrical Times. (B 23)

DESIGN and development. ASSISTANT to chief designer required by switchgear manufacturers in South West England. Draughtsman with good mechanical and electrical knowledge, and preferably with previous experience of medium voltage switchgear development. Applicants should be 25/35 years of age, and should have National Certificate or equivalent. Progressive and permanent position with good salary for man with initiative.—Box No. 1967, Electrical Times. (A 707)

**BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2**

### WORKS MANAGER

(35/38) required for small cable works. Previous experience and proved ability in progressive management essential. Commencing salary £1,000 per annum. Full details, in confidence, please, to:

**Box No. 1995, Electrical Times.** (B 52p)

DRAUGHTSMAN for transmission line work preferably with experience of profiles and a good knowledge of sag and tension calculations.—State age, experience and salary required to Box No. 609 Keith and Co., Advertising Agents, Edinburgh. (A 702)

ELECTRICAL DRAUGHTSMEN required for lighting installations and power distribution layouts for industrial plants. London office; pension scheme; 5-day week.—Write full particulars, age, qualifications and experience to Box 6152, c/o Charles Barker and Sons Ltd., 31 Budge Row, London, E.C.4. (B 47)

ELECTRICAL EXPERIMENTAL ENGINEER required for light mechanical and electrical works in Southern England. Good knowledge of induction motors together with a practical experience of at least three years required. Age preferably 25 to 35 years. The products at present manufactured include induction motors up to 5 h.p. and small a.c./d.c. apparatus. Special consideration will be given to applicant who possesses drawing office experience, and who can carry out the development and design work of electrical equipment. Please state past experience and salary required.—Box No. 1945, Electrical Times. (A 622)

ESTIMATOR (JUNIOR) required by electrical manufacturers dealing with specialised motors and generators. Preferably with test bed experience. London district. State experience, age and salary required.—Box No. 1981, Electrical Times. (B 22)

HANDLEY PAGE (Reading) LTD., The Aerodrome, Woodley, Reading, have a vacancy in their Design Office for a SENIOR AIRCRAFT ELECTRICAL DRAUGHTSMAN. They have an interesting project in hand and the post is progressive and offers good scope for advancement to the right man.—Please send full particulars to the Personnel Officer. (B 21)

IMPORTANT position available to Steel Tank Mercury Arc Rectifier qualified DESIGNER. Applicants should be well experienced in the engineering design and manufacture of this class of rectifier.—Apply, giving full particulars of experience, to Box No. 1957, Electrical Times. (A 682)

LOW VOLTAGE BULBS, motor car, cycle, telephone, etc. FOREMEN wanted for Stem-making, Welding, Sealing, etc. South-west London area. Good remuneration for fully qualified persons used to handling labour. Housing accommodation available.—Box No. 1963, Electrical Times. (A 701)

MACHINES AND CONTROL GEAR ENGINEER required by the Steel Company of Wales Ltd., for their Electrical Development Department. Applicants must have had design experience with a leading manufacturer, preferably engaged on electrical equipment for iron and steel works, and should possess an electrical engineering degree or equivalent.—Applications should be addressed to: The Personnel Superintendent, The Steel Company of Wales Ltd., Box No. 3, Port Talbot, Glam. (B 5)

MANAGER required for cable factory producing rubber and plastic cables. Must be very strict disciplinarian and an expert practical man. Accommodation provided.—Write, stating age, experience and salary required. Box No. 1999, Electrical Times. (B 54)

PIRELLI-GENERAL CABLE WORKS LTD., have vacancies for experienced ENGINEERS to supervise erection of steel tower and wood pole transmission lines.—Write, giving experience, age and salary expected, to Overhead Lines Department, Eastleigh, Hants. (B 19)

### SALES MANAGER

of proved organising ability and good general knowledge of electrical industry required in the North. A knowledge of sales of small cables throughout the country a considerable advantage. Directorship available for suitable applicant. Commencing salary £1,000 per annum. All applications will be treated with the strictest confidence.

**Box No. 1997, Electrical Times.** (B 53p)

*Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.*

NETWORK ANALYSIS. A vacancy exists in the research organisation of A. Reyrolle and Co. Ltd., for an ENGINEER experienced in power system analysis to take charge of the operation of a full-scale transient and steady-state network analyser. Previous experience in analyser operation is necessary.—Application should be made to the Chief Engineer, A. Reyrolle and Co. Ltd., Hebburn, Co. Durham. (B 20)

SALES MANAGER for manufacturers of electrical wiring accessories required. Applicants should have longstanding experience. Excellent prospects for the right man. Send full particulars which will be treated in complete confidence.—Box No. 1991, Electrical Times. (B 46)

SALES MANAGER required by important firm of electric cable manufacturers. Applicants must possess sound electrical technical knowledge and be good correspondents. Excellent opening and prospects.—Apply stating age, experience and salary expected to Box No. 1985, Electrical Times. (B 43)

SECRETARY required by important electrical manufacturing company in South Africa. Applicants must be first-class accountants as they would be in charge of the accountancy department in addition to carrying on the secretarial duties of the Company. The position is a permanent one and the opening and prospects very good.—Apply stating age, experience and salary expected to Box No. 1989, Electrical Times. (B 45)

SENIOR DRAUGHTSMAN required for work on Electrical Power Resistances and large electric heaters for industrial applications. Previous experience on this class of work desirable but not essential.—Apply by letter with full details including age, technical qualifications, whether married or single, and salary required, to Box No. 1965, Electrical Times. (A 706)

SMALL ELECTRIC MOTORS LTD., Eagle Works, Churchfields Road, Beckenham, Kent, require AGENT for sale of motors up to 10 h.p. for the West country. Must have knowledge and experience of electric motors and applications. Retainer and commission.—Apply Personnel Manager. (A 717)

TRANSMISSION LINE CONSTRUCTIONAL ENGINEER is required by old-established British Cable Company for service in India and Pakistan. Applicants should have had an electrical training and at least 5 years experience in charge of the construction of steel tower lines for working voltages of 66 kV and over. The salary will be according to experience and qualifications, and terms and conditions of the appointment will be discussed with applicants who are invited to an interview in London. Applications (stating age) should include full details of education, qualifications, training and experience.—Box No. 1975, Electrical Times. (B 7)

WANTED, capable REPRESENTATIVE already calling on leading stores in Scotland, Midlands, East and South-east England and Wales. To introduce new type of light fitting, which is already well established in London. 10% commission. Own car essential.—Sterling Light Co., 50 Ledbury Road, London W.11. (B 4)

WORKS MANAGER required by important electric cable manufacturing company. Applicants must possess first-class experience in the manufacture of all classes of electric cables and have a good knowledge of electrical and mechanical engineering. Excellent opening and prospects.—Apply stating age, experience and salary expected to Box No. 1987, Electrical Times. (B 44)

## APPOINTMENTS WANTED

B.Sc.(ENG.), A.M.I.MECH.E., A.M.I.E.E., 39 years old; ex-B.T.H. student apprentice; 3 years captain R.E.M.E. India-Egypt; 8 years' experience technical sales switchgear (h.t. and l.t.) transformers, rotating plant, control gear, instruments, etc., seeks responsible post, preferably in sales (but others considered) in London, Home Counties or South Wales areas. Extensively travelled abroad. Willing travel in Europe or America for inspections, negotiations, etc.—Box No. 1947, Electrical Times. (A 631)

## WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 5566 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx. (A 19)

CASTINGS. Fisher Foundries, Ltd., Great, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (A 647)

CONDENSER AND TRANSFORMER CASES. Special boxes and covers. Sheet metal and press-work for the electrical trade. May we quote you? A.I.D. approved.—Conway-Tolhurst Ltd., Airport, Cardiff. (A 613)

METALWORK. All types cabinets, chassis, racks, etc., to your own specifications.—Philpott's Metalworks, Ltd., Chapman Street, Loughborough. (A 252)

MOTOR GENERATOR SETS built to customers requirements from new and/or modern reconditioned machines. Guaranteed for twelve months. Good deliveries, competitive prices.—Enquiries to Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 23611 (Ext. 347). (A 709)

WELDING WORK WANTED. Large capacity available in all materials and methods. Keen prices and good workmanship. Difficult jobs our speciality. A.I.D. approved.—Conway-Tolhurst Ltd., Airport, Cardiff. (A 612)

ZEROS REFRIGERATORS. Complete range of REPAIR AND SERVICE now available. Equipment reconditioned to pre-war manufacturers' specifications.—Time Engineers Ltd., Refrigeration Specialists, Victory Road, Rainham, Essex (Rainham 4625), or Southern Area Agency (Tel.: Sloringpark 4217). Electrical spares supplied to the trade. (B 55)

## AGENCIES

INTRODUCTORY COMMISSIONS payable to firms or persons, on sales of brass, aluminium, copper rods, sheets and tubes, at competitive prices.—Box No. 1931, Electrical Times. (A 585)

## WANTED

A.C.-D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 11)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 7)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED, ROTARY CONVERTORS, any size.—Universal, 221 City Road, London E.C.1. (A 9)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube boilers for dismantling.—Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath, Staffs. (A 3)

WASTE MERCURY urgently wanted; packing instructions sent; also aircraft sparking plugs, platinum contacts (new or used) and scrap precious metals in any form. Please forward samples, stating quantities. Immediate cash on collection. Non-ferrous metals also bought.—Belgrave Buyers (E.T.), 5 Belgrave Gardens, London, N.W.8. MAI 7513. (A 710)

**£50,000**

Immediate cash available for purchase of New Ball and Roller Bearings, all types. Steel Balls and Rollers. Top prices paid. Purchases from Traders only.

**CLAUDE RYE BEARINGS**

895-921 Fulham Road, London, S.W.6

RENown 6174 (20 lines) (A 328p)

## BUSINESS OPPORTUNITIES

FANS. Manufacturers of oscillating and extractor fans require the services of Agents or Sales Organisation well introduced with Wholesalers or Retailers, Electricity Corporations, etc. Commission or buying basis.—Box No. 1977, Electrical Times. (B 9)

MOTORS. Representatives well introduced with industrial concerns required to sell range of high quality shaded pole type motors up to $\frac{1}{32}$ h.p.—Box No. 1979, Electrical Times. (B 10)

## FOR SALE

### CABLES & WIRE

TINNED STEEL ARMATURE BINDING WIRE. All sizes from 14 s.w.g. to 30 s.w.g. supplied in coil or on reels.—Frederick Smith and Co., Wire Manufacturers Ltd., Caledonia Works, Halifax. (A 22)

4,000 yards 0·06 four-core P.I.L.C.S.W.A. and S. 660 V. New C.M.A. Cable. Test certificates available.—A. and H. Evans, 65 Birkbeck Road, Ilford, Essex. (A 634)

### DOMESTIC APPLIANCES

IMMERSION HEATERS, GRUBB new 8 kW model. No Purchase Tax. All lengths 16 in. to 30 in. Provision for intermediate loading. Fully guaranteed. Immediate delivery.—Write for list and trade terms to Distributors, John Owner and Co. Ltd., Springfield Road, Birmingham 13. Tel.: Springfield 2939. (B 25)

### ENGINEERING PLANT & MATERIALS

BERYLLIUM COPPER STRIP: ⅛ in. x 26.G; ¼ in. x 28.G—⅛ in. x 28.G; in coil.—Parnall (Yate) Ltd., Yate, near Bristol. Tel.: Chipping Sodbury 3231. (A 711)

FOR SALE. QUANTITY CONDUIT, several sizes, surplus to requirements on contract. Also quantity conduit fittings and bakelite ditto. Room wanted.—Apply Box No. 1993, Electrical Times. Situate Midlands. (B 48)

WELDING EQUIPMENT. Four 10-kVA. 200/500 V, 50 cycles, transformer welding equipment by Actarc, output 15/200 amps.

D.c./d.c. Motor Generator Welding Set by Quasi Arc/Laurence Scott 480 V d.c., output 20/80 V, 200 amps, ball bearings, with starter, voltmeter, and ammeter, mounted on bogey.

Several 22/32-kVA Transformer Welding Sets, input 400 V, 50 cycle supply, double and single operator type, oil immersed transformers, output 15/250 amps, maximum range 500 amps, with regulators, mounted on bogeys.

200/440 V, 50 cycle supply, air cooled Transformer Welding Set by Metropolitan Vickers. "Thermac" type, output 85/95 V, 300/450 amps with regulator and ammeter.

Oil immersed Transformer Welder by English Electric Co. 400 V, 50 cycles, input, output 5/300 amps. Also switch giving low, medium and high output. With regulator.

36-kVA. Sciaky Spot Welder, 400 V, 50 cycle supply, watercooled electrodes, pneumatic operated head by foot switch, 18 in. throat, tapping switch giving short, medium and long welds, with Igranic timer.

250-amp. single operator petrol driven Welding Generator Set comprising Morris 4-cyl. engine, hand starting, complete with daily fuel tank, usual accessories for engine, direct coupled to 7·5 kW. 30 V, 250 amp. d.c. generator, ammeter, voltmeter. On fabricated chassis.

Petrol driven Welding Set comprising 6-cyl. engine, electric starting, direct coupled welding generator 16/80 V, 625/312 amps, inbuilt exciter running at 1,500 r.p.m., complete with current regulator, voltmeter, ammeter.

George Cohen, Sons and Co., Ltd., Wood Lane, London, W.12. Tel.: Shepherds Bush 2070 and Stanningley, nr. Leeds. Tel.: Pudsey 2241. (B 8)


**750,000**

NEW BALL RACES, ROLLER, THRUST AND TIMKEN RACES IN STOCK. STOCK LISTS AVAILABLE.

**CLAUDE RYE BEARINGS**

895-921 Fulham Road, London, S.W.6
RENown 6174 (20 lines) (A 329p)


### GENERATING PLANT

#### FLINTSHIRE COUNTY COUNCIL

FOR SALE Two Listard 9 h.p. SINGLE CYLINDER WATER COOLED COMPRESSION IGNITION (DIESEL) ENGINES by R. A. Lister and Company, Ltd., together with subsidiary equipment.—For particulars apply to Clerk of County Council, Mold, Flintshire. (B 49)

DIESEL ALTERNATOR SETS in stock up to 500 kVA, 400/440 V, 3-phase, 50 c/s, 4-wire. Detailed stock list post free on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel.: 26311 (Ext. 347). (A 712)

### LIGHTING EQUIPMENT

PURLEY CHOKES AND BALLASTS. Our 80 W Tapped h.p.f. Ballast, with Starter Switchgear-holder incorporated, is proving itself the most popular unit. Suitable for most fittings. 57/6 each, subject.—F. W. Blanshard, Ltd. (Dept. ET), Purley, Surrey. Uplands 4818-9. (A 20)

QUANTITIES of 75-100-150 W DISPERSIVE REFLECTORS and also 100 W vertical ELLIPTICAL REFLECTORS to clear at 50% off list price. Send for sample.—J. E. Wildbore, Ltd., 6/12 Peter St., Oldham (Main 4475). (B 50)

### METERS

A.C./D.C. QUARTERLY and SLOT METERS.—Brent Electrical Co., 6 Holmdale Gardens, N.W.4. (A 5)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London, E.C.1. (A 14)

METERS, a.c. and d.c., new and reconditioned, all types. Quarterly, single and 3-phase, 3- and 4-wire 2½ to 1,000 amp. Prepayment, single and double tariff, single, dual and triple coin, fixed and variable tariff, 2½ to 50 amp. M.D.I. Billiard Switches, Rent Collectors. Prices from 5/-, carriage paid. Guaranteed for ever. Immediate delivery.—Illustrated catalogue from the Electric Meter Company, Castor Road, Brixham. (A 170)

### MOTORS & STARTERS

A.A. ELECTRICAL CO. FOR A.C.-D.C. MOTORS-SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Chiswick 5605, 67 Rothschild Road, W.4. (A 10)

A.C. and D.C. MOTORS, all sizes, large stocks. Fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22. (Forest Hill 2278-9.) (A 5)

A.C. and D.C. MOTORS, GENERATORS, from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 5566/9. (A 13)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7322. (A 6)

A.C. MOTORS, BRAND NEW. Delivery from stock. Fractional to 200 h.p., 600, 750, 1,000 and 1,500 r.p.m., 400/440 V, 3-phase, 50 c/s, with or without control gear. Also numerous reconditioned a.c. and d.c. motors and other electrical plant. Detailed price stock list post free on request.—Thos. W. Ward, Ltd., Albion Works, Sheffield. Tel. 26311 (Ext. 347). (A 713)

CROMPTON PARKINSON MOTORS, 1/6 h.p. 1/230/50. New, £3 18s. 6d. Carriage 5s. 6d. B.T.H., 1, 1/230/50. £5. Carriage 5s. 6d. 400 other motor bargains.—L. C. Northall, 16 Holly Road, Quinton, Birmingham 32. (A 633)

FOR ELECTRICAL MOTORS, GENERATORS, ALTERNATORS SWITCHGEAR, please send your inquiries, to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (A 16)

FOUR 2 h.p., one 1 h.p. and three 10 h.p. ELEC. MOTORS, all 3-phase, 400/440 V, good condition for disposal.—Apply: Nettle Accessories Ltd., Harper Road, Wythenshawe, Manchester. Tel.: Wythenshawe 2291. (B 26)


**All types and sizes of**
**Industrial Electrical Equipment**

**ELECTROPOWER COMPANY LIMITED**
Kingsbury Works, Kingsbury Road, London, N.W.9
Telephone: COLindale 4621/2. (A 18p)

### SWITCHGEAR

MERCURY SWITCHES are made by Hall Drysdale and Co., Ltd., of 58 Commerce Road, Wood Green, London N.22. Tel.: Bow 7221. (A 15)

### TRANSFORMERS & CONVERTORS

RECTIFIER E.C.C., 6,600 V, 3-phase, 50 cycles. Output 460 V, 120 kW 2-wire. Transformer also tapped for 415 V, 3-phase, 50 cycles, 195 kVA. Offers please.—Ellis and Ward Ltd., 179 Corporation St., Birmingham 4. (B 27)

TWO 1,000 kVA outdoor type TRANSFORMERS by Johnson and Phillips, new 1941, ratio 10,750/400 volts, 3 phase, 50 cycles, fitted with trifurcating boxes, off load tapping switch, etc. As new.

Two B.T.H. Draw out type H.T. SWITCHES, complete with meters, etc., for above, new 1941.

Two Crompton Parkinson L.T. Drop down type SWITCHES with meters, etc., for above, new 1941.

Two Crompton Parkinson 4-panel L.T. SWITCHBOARDS, 400/3/50, fitted with 600 amp. drop down type circuit breakers, meters, etc.

F. Burrill and Co., 109 Pencisely Road, Llandaff, Cardiff. Telephone: Llandaff 95. (A 617)

### UNCLASSIFIED

THE VAPOR PHASE COOLING SYSTEM fitted to ANY DIESEL or INTERNAL COMBUSTION ENGINE will provide factory heating or process steam, at no cost for fuel, besides lengthening the life of the engine. VAPOR PHASE recovers waste heat as live steam, pays for itself in the first year, costs nothing to operate and is good for life. Send for Leaflet VP 219.—Bastian and Allen, Ltd., Ferndale Terrace, Harrow, Middlesex. HARrow 7171/6. (A 303)

## BUSINESSES FOR SALE

ELECTRICAL CONTRACTING BUSINESS (North London). Including van, trade tools, stock, etc. Lock-up shop at low rent. Phone installed.—Box No. 1971, Electrical Times. (A 716)

## MISCELLANEOUS

CITY AND GUILDS (Electrical, etc.) on "No pass-No Fee" terms. Over 95% successes. For full details of modern courses in all branches of Electrical Technology send for our 144-page handbook FREE and post free.—B.I.E.T. (Dept. 39), 17 Stratford Place, London W.1. (A 54)

FREE! Brochure giving details of courses in ELECTRICAL ENGINEERING and ELECTRONICS, covering A.M.Brit.I.R.E., City and Guilds, etc. Train with the Postal Training College operated by an Industrial Organisation. Moderate fees.—E.M.I. Institutes, Postal Division, Dept. ET.29, 43 Grove Park Road, London, W.4 (Associate of H.M.V.). (A 305)

THE PROPRIETOR of British Patent No. 624766, entitled "MEANS FOR AUTOMATICALLY ADJUSTING ARC FURNACE ELECTRODES," offers same for license or otherwise to ensure practical working in Great Britain. —Inquiries to Singer, Stern and Carlberg, 14 East Jackson Boulevard, Chicago 4, Illinois, U.S.A. (B 13)

**LONDON COUNTY COUNCIL**

*Courses of instruction for members of the staffs of the electricity supply undertakings are provided at:—*

EAST LONDON COLLEGE OF COMMERCE
Vallance Road, Whitechapel Road, E.1.

PECKHAM COLLEGE OF COMMERCE,
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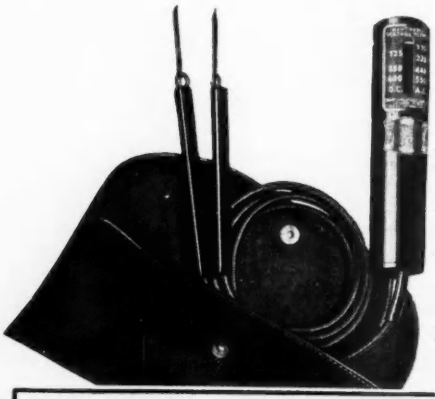

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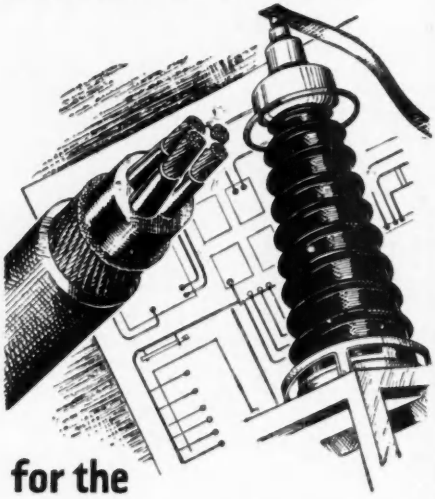

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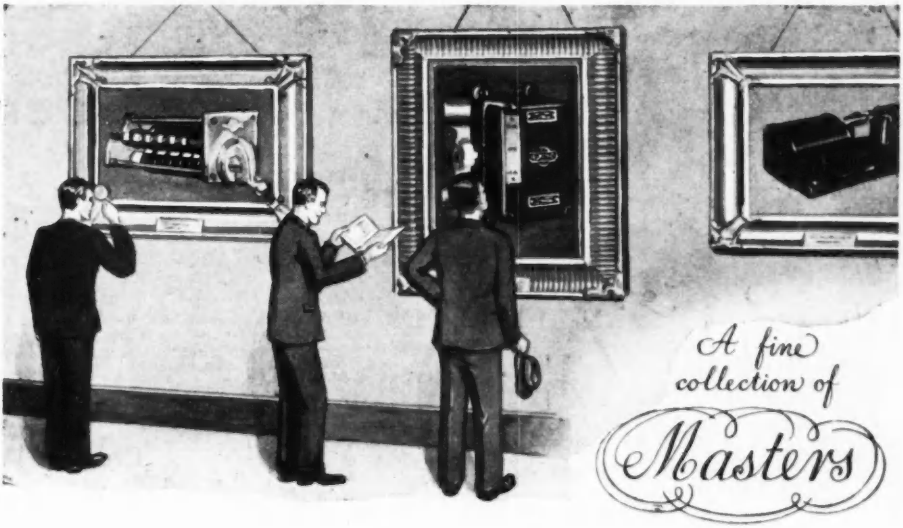

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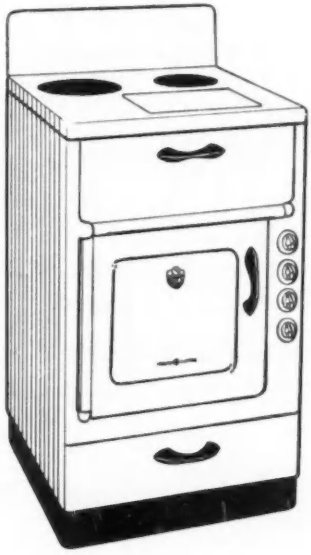

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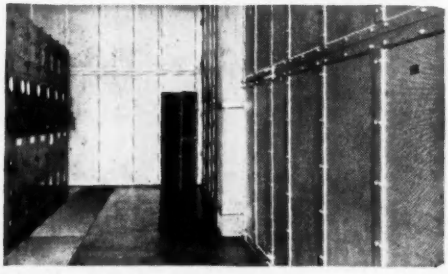

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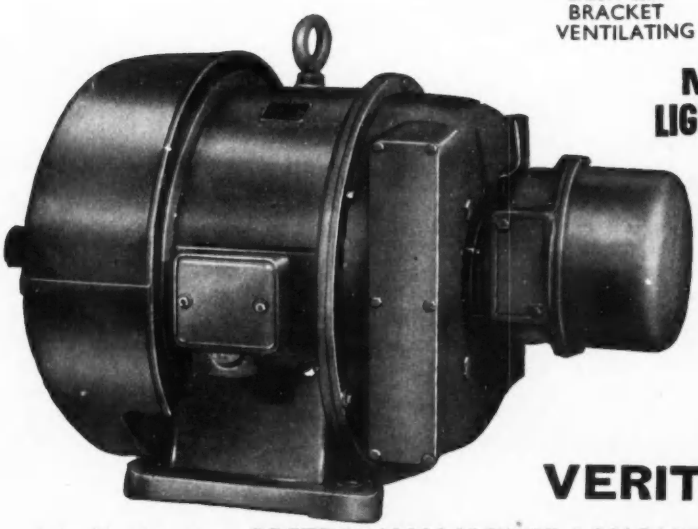

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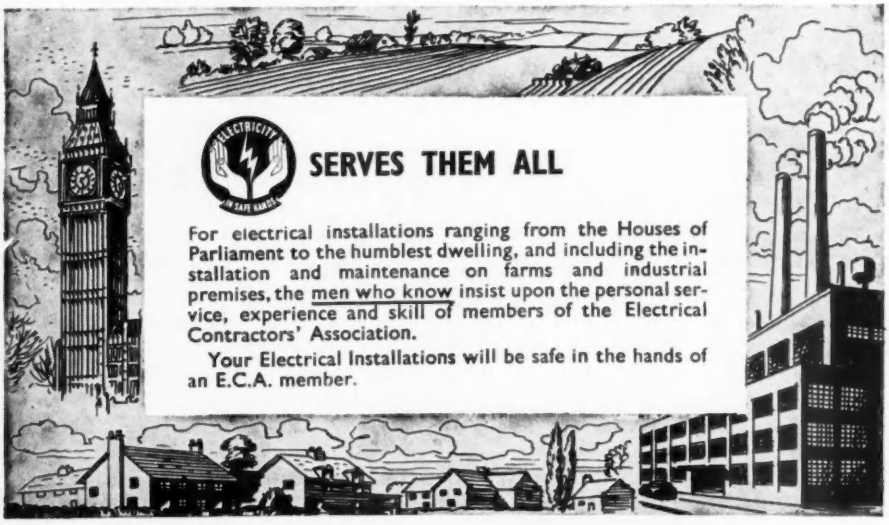
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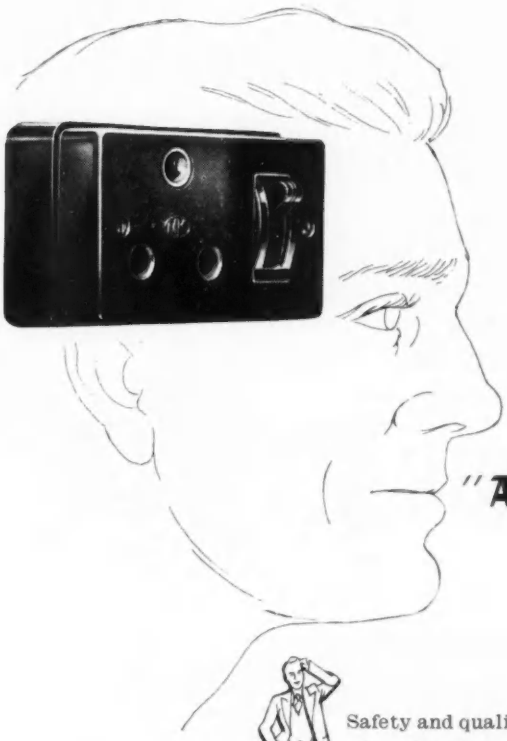

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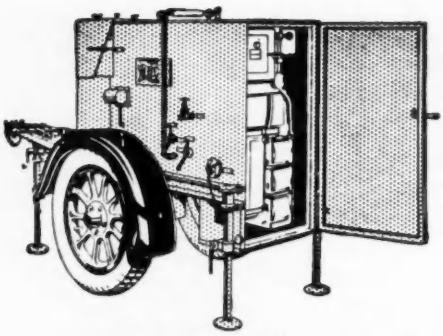

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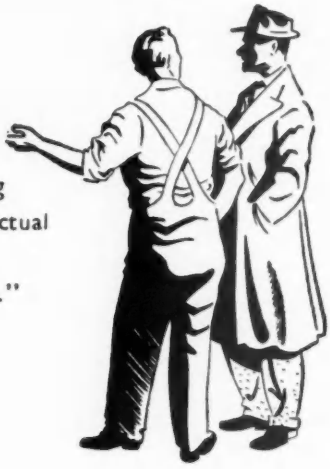

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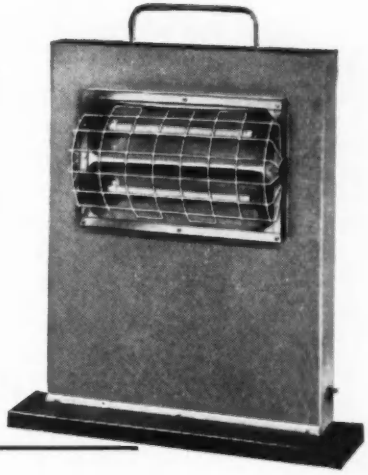

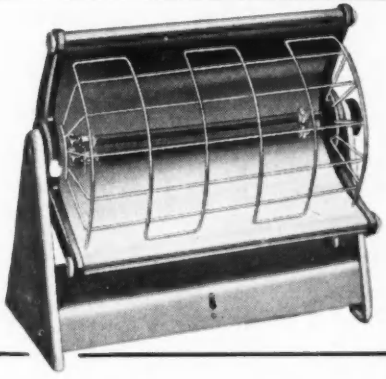

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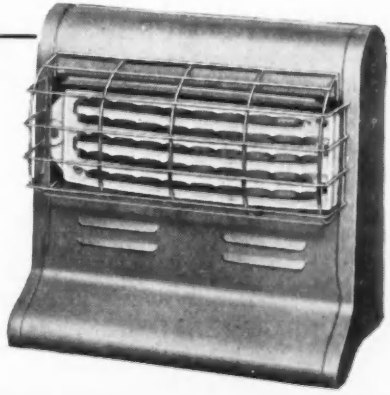

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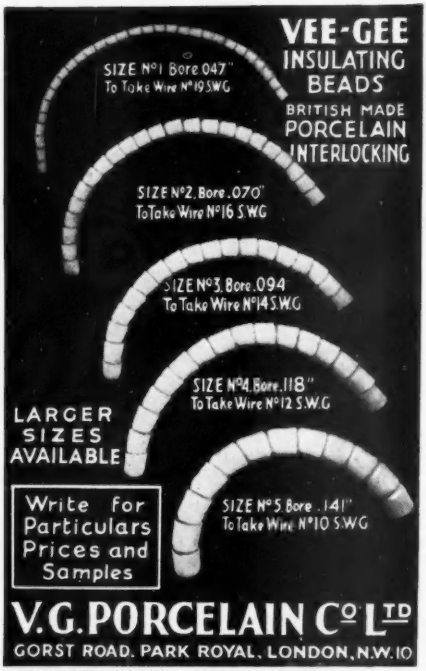
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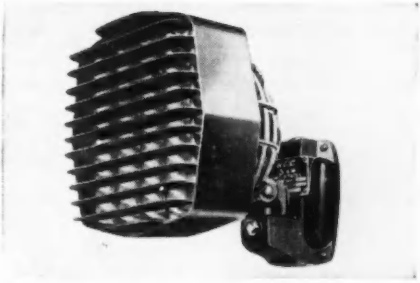

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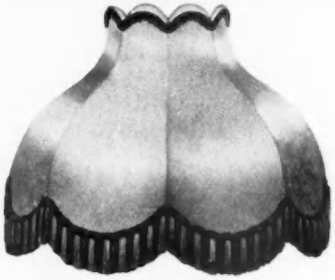

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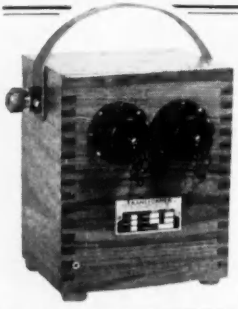

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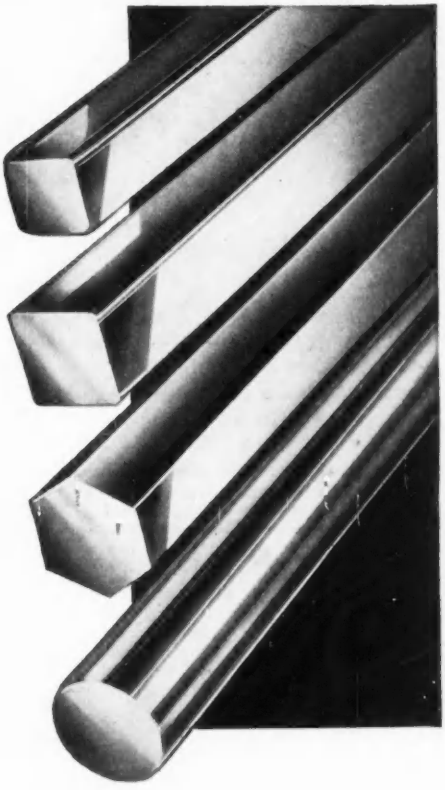

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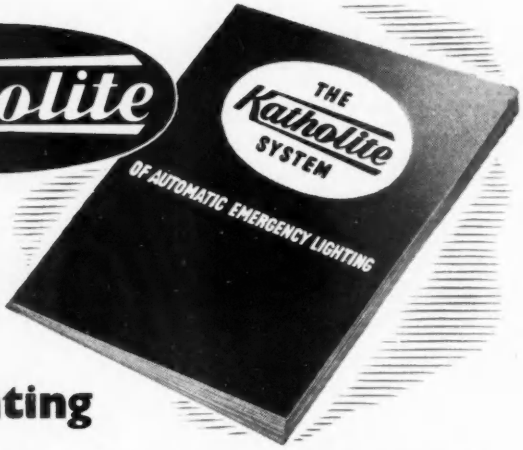


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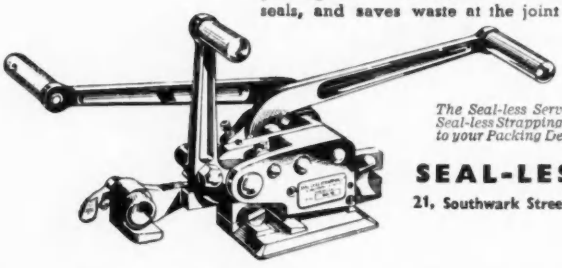

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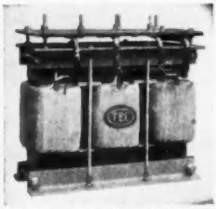

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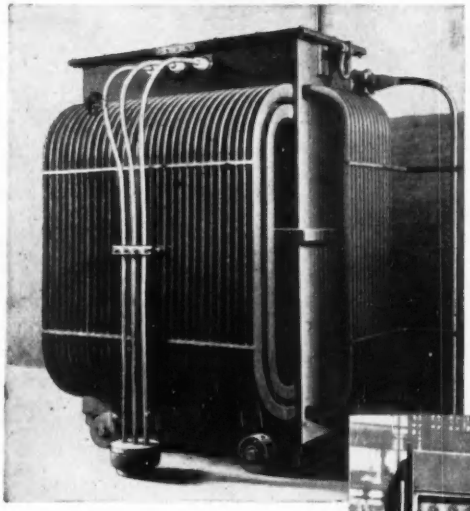

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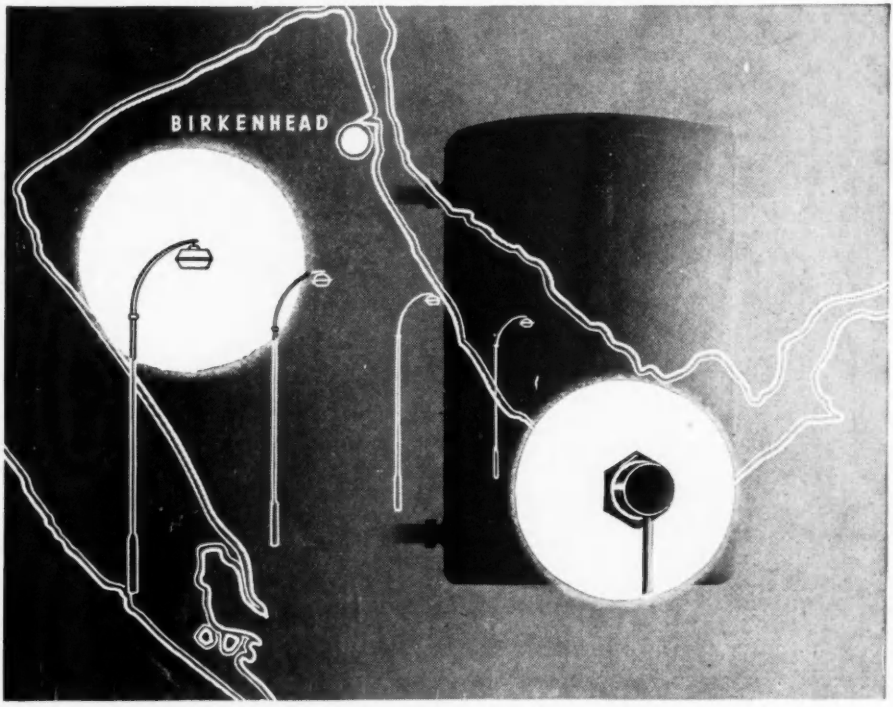


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# TRANS-WORLD QUIZ

✷

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## **How** did Gin get its name?

## **What** Orange ruled England?

POLDER is land reclaimed from the sea in Holland — which should really be called The Netherlands. The same country is the traditional home of gin. The name is an abbreviation of the word "geneva", which is a corruption of the Dutch and French names for the juniper berry used to flavour gin. William III of England was a descendant of the Dutch Royal House of Orange.

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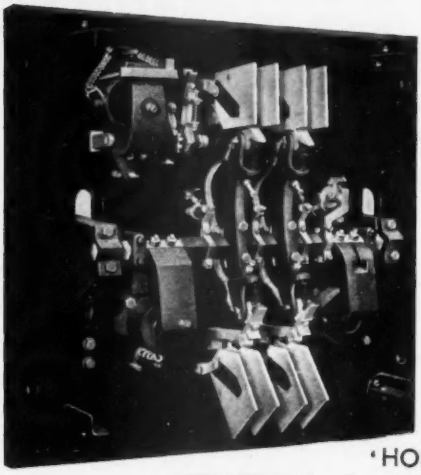

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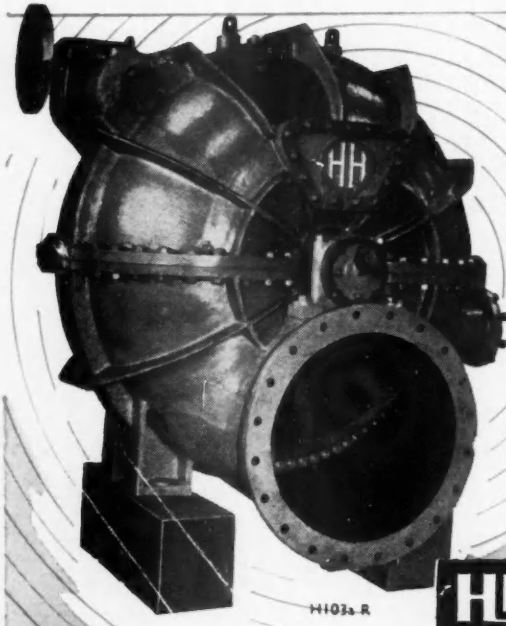


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